# ANNALS OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

VOLUME 26 JANUARY 1960 No. 1

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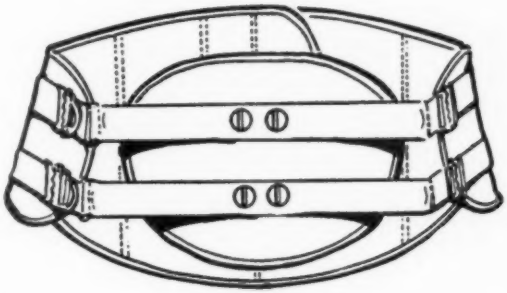

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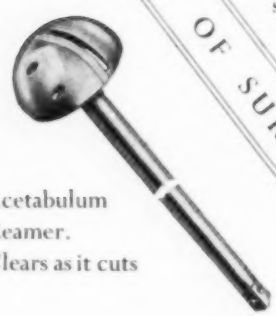

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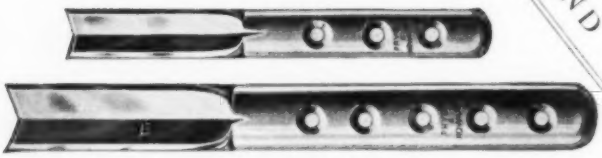

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Brit. Med. J. *ii*, 658, Oct. 10th 1959

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**References** *Lancet*, 1957, *ii*, 1157
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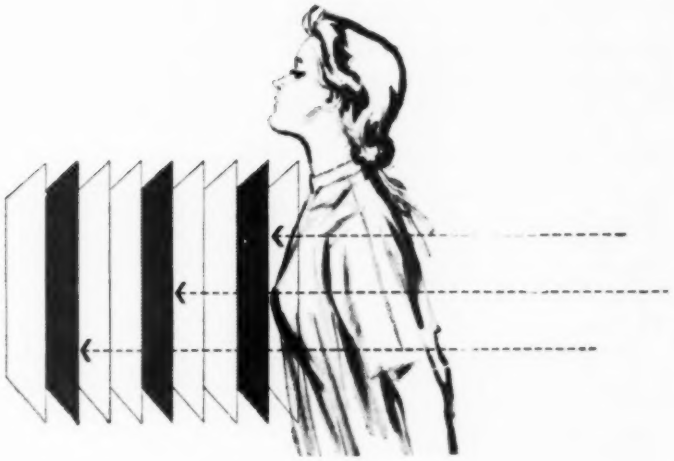

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SIR CECIL WAKELEY, BT., K.B.E., C.B., LL.D., M.Ch., D.Sc., F.R.C.S., F.R.S.E., F.F.R.

Volume 26 JANUARY 1960 No. 1

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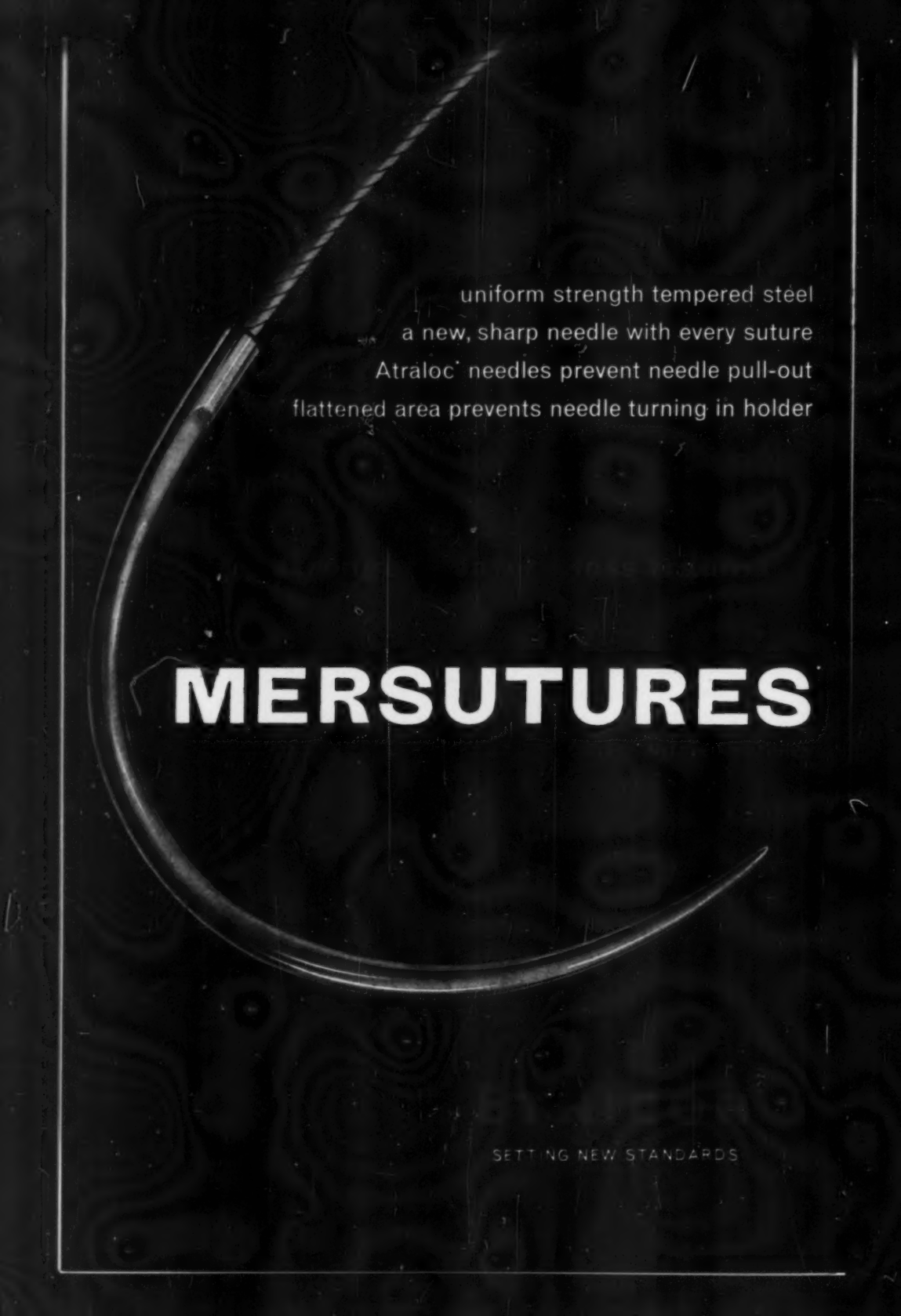
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Volume 26 JANUARY 1960 No. 1

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ANNALS OF
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# SERGEANT SURGEONS TO THEIR MAJESTIES

Thomas Vicary Lecture delivered at the Royal College of Surgeons of England
on
29th October 1959
by

**Henry R. Thompson, F.R.C.S.**
Surgeon, St. Mark's Hospital; Master of the Worshipful Company of Barbers

I WOULD LIKE to thank the College of Surgeons for bestowing on me the honour of this lectureship. While it is the fifth time that the lecture has been given by a Master of the Barbers' Company, it is the first time that it has been given by a Master in his year of office.

The basis or principal ingredient of the prescription for a Vicary Lecture is the history of anatomy or surgery, but it is left to the lecturer to choose his corrective and vehicle to make the draught palatable, stimulating and free from soporific effects.

Some of you may indeed ask why the Master of the Worshipful Company of Barbers should be lecturing in this great hall of the Royal College of Surgeons on an anatomical or surgical subject. May I remind you that at the beginning of the 12th century there were no doctors as we know them today, the priests caring for the physical as well as the spiritual needs of the people. The barbers were in frequent attendance on the priests because of the ecclesiastic custom of shaving the crown of the head and they eventually became the priests' assistants, performing phlebotomy or blood letting and other minor operations. In 1163, Pope Alexander III proclaimed in an edict of the Council of Tours that the Church Abhorreth Bloodshed and forbad the priests to practise surgery. What could be more natural than that surgery should pass into the hands of the priests' assistants, the barbers? For the next 600 years the Guild of Barbers, and later the Company of Barber Surgeons, was the ruling body in surgical matters in England, but with the development of surgery it was inevitable that the trade of haircutting, shaving and beard trimming should be divorced from the science and art of surgery and this separation finally took place in 1745, when the Company of Surgeons (which later became this Royal College) was formed.

The Worshipful Company of Barbers did not die as a result of this amputation and, in fact, it is now as strong and as flourishing a City Livery Company as it has ever been. Its members, however, now come from all walks of life. Many surgeons and physicians maintain a link with the past by membership of our Company. Here, then, is the connection between barbers, surgeons and your lecturer today.

A surgeon shoulders his responsibilities in gradually increasing loads. First, as a student, he looks after the surgical dressings of his patients. After qualification, he performs minor and then major operations under supervision. Later he accepts full responsibility for his patients and with

the passing years his reputation may develop to such an extent that a colleague trusts him with the care of his relatives—or even himself! To most surgeons this is the final trust. To a select and chosen few, however, will come the honour of being appointed surgeon to the reigning monarch and, with it, the age-old title of " Sergeant Surgeon ".

Why " sergeant " surgeon? Sergeants are familiar to most of us as the much pilloried N.C.Os. in the Army or Police Force. Here the word denotes rank but, although early Sergeant Surgeons were military surgeons who followed their king into battle, the word " sergeant " as applied to them probably had no connection with the military rank dating from the 13th century.

The word " sergeant " comes from the Latin " serviens " meaning " serving ". The word is used in the Domesday Book, and in feudal times, when dignities, honours, offices and the tenure of land were bestowed by the Crown, the title denoted someone who performed a personal service to the king or queen or who held his lands and tenements as a reward for such services in the past. Thus the title is used to describe officials of the royal household—the Sergeants at Arms, to one of whom is assigned the special duty of attending the Speaker of the House of Commons and to another is assigned a similar duty to the Chancellor of the House of Lords. A Sergeant at Law is the highest order of Counsel at the English Bar and Sergeant Surgeon is the senior surgical appointment to the royal household—both titles implying personal service to their majesties.

**Duties and rewards**

The appointment of sergeant surgeon carried certain duties and also had its rewards. In mediaeval times, when the country was not at war, there was very little major surgery, but all external conditions, such as skin diseases and ulcers, were regarded as coming within the province of a surgeon. To be at peace, however, was the exception rather than the rule and the first duty of a sergeant surgeon was to follow his monarch into the field of battle. John of Arderne, the Father of Proctology, is known to have accompanied Edward III at the Battle of Crècy, and during the next 400 years accompanying the king into battle was the main duty of a sergeant surgeon.

Another duty was to be present at the torture or maiming of state prisoners. He had to ensure that the torture was not so prolonged as to endanger the prisoner's life and, where the sentence for a crime involved an amputation, the sergeant surgeon was responsible for seeing that the haemorrhage was staunched and the stump properly dressed.

A less gruesome duty was the " screening " of applicants to be touched by His Majesty for the cure of the King's Evil, or tuberculous glands of neck. In presenting patients for this ceremony, the sergeant surgeon had to make sure that none of the sufferers was too advanced or hopeless,

lest failure to cure such cases endangered the reputation of the remedy. Touching for the King's Evil or scrofula was instituted in the reign of Edward the Confessor and continued for almost 700 years, until the reign of Queen Anne, when the last recorded service for the royal healing was held at St. James's Palace in 1714.

Whether the later sergeant surgeons really believed in the efficacy of the royal touch or not, they were astute enough to realize that many of the applicants came from afar and that their pilgrimage involved leaving their dark, damp cottages for a journey in the open air and sunshine which, by itself, would contribute to recovery.

Sergeant surgeons were also responsible for embalming the royal corpse. Two sergeant surgeons were paid £122 8s. 9d. for opening and embalming George II, but it is interesting to note that the apothecary received the sum of £152 for a fine double cere cloth and for a due quantity of rich perfumed powders.

The rewards of a sergeant surgeon were sometimes unexpected and unlooked for. Austrigilda, wife of King Gontram of Burgundy, had her two doctors slain and buried with her—perhaps to ensure the continued presence of her favourite medical attendants in the hereafter. She must have hoped that, as a queen, she had some special dispen ion and that the popular expression " You can't take it with you " would not apply to her. In this instance, such treatment of royal surgeons might be regarded as an honour, but in early days surgeons were put to death for failing to save their king's life in the field of battle.

At its foundation, the office carried a salary of 40 marks a year, together with an allowance for meat and drink which was known as a " bouge of court ". This included wax and all such necessaries for carrying out cures. In times of war, the pay of a sergeant surgeon was £10 quarterly, plus 10 pennies a day subsistence allowance, plus prisoners and plunder; but if the plunder amounted to more than £20, one third of this had to be given to the king. Sergeant surgeons also had the privilege of drawing two " buttes of sacke " per annum from the royal cellars. Their reward for dressing the king's wounds was to retain all the napkins and other fine linen used for such dressings. Rewards also varied with the condition to be treated. For instance, the fee for curing a wound that was not dangerous was the retention of such garments as were stained with blood, but the fee for curing any dangerous or mortal wounds was 180 pennies, plus maintenance—in addition to the blood-stained garments.

Sergeant surgeons have held certain privileges with all three governing surgical bodies. Firstly, when the Barber Surgeons were in power, a member of the Company appointed sergeant surgeon was elected at the first vacancy to the Court of Assistants and was made Master at the election following his appointment to the Court. A sergeant surgeon would therefore become Master of the Company even though he had not

served the Company in the lower offices of Warden and Renter Warden and thus took priority over other candidates. In the right of the dignity of his office the Sergeant Surgeon sat next to the last Master of the Company on the bench where the Master usually " do sitt ".

After the formation of the Surgeons' Company in 1745, the Sergeant Surgeon was admitted into the Council and Court of Examiners on the first vacancy and looked upon as Master, and, when the Royal College of Surgeons was founded, sergeant surgeons were admitted by Royal Charter to the Council and Court of Examiners. This custom has now ceased.

Medical services rendered at Court have been acknowledged by the granting of various titles—peerages, baronetcies, knighthoods and ensigns armourial. The first knighthoods to be granted were in the reign of Henry VIII—to John Aylef, who was said to have cured his king of a fistula, and to John Elliott, physician. The first medical baronetcy to be conferred was on Edward Greaves, Physician in Ordinary to Charles I. The title was conferred during the Civil War, while the king was staying at Oxford. The first sergeant surgeon to receive a peerage was Joseph Lister, the founder of antiseptic surgery, who was created Baron Lister of Lyme Regis in the County of Dorset by Queen Victoria. A lesser reward was the granting of armourial bearings. If the recipient was not entitled to armourial bearings he received a grant of arms, the charges on the shield usually having reference to his profession. A medical man already possessing a family coat of arms might be granted a royal augmentation indicative of his attendance upon his sovereign and often ordered by the sovereign himself.

Although it is stated by such authorities as Sir d'Arcy Power and Sidney Young that the first well-authenticated record of sergeant surgeoncy was the appointment of William Hobbes as Sergeant Surgeon to Henry VI in 1461, there are many earlier records of surgeons serving their king to whom the title might well have been given.

Edward II was the first English monarch to appoint a medical staff at Court. John of Gaddeson, Robert the Cysterne and Pontius de Courtone were his physicians (John of Gaddeson had also attended Edward I and is referred to as a medical authority in the Prologue of Chaucer's *Canterbury Tales*). But none of Edward's three physicians was able to prevent his murder. You may recollect that, disgusted with Edward's misrule and unnatural lewdness of behaviour, Queen Isabella and Roger Mortimer conspired to depose the king. Edward was imprisoned. To hasten his end, the king was moved in midwinter, at first by day and then by night, from castle to castle and was subjected to much barbarity, including being shaved in the open in cold weather with a blunt razor. In spite of this treatment, the king lived on until the Bishop of Hereford sent an ambiguous message to the king's custodian at Berkeley Castle. It was written

in Latin and could be read in one of two ways, depending upon where the comma was placed:

Edward kill not, to fear the deed is good.
Edward to kill fear not, the deed is good.

The king's gaolers took the hint and interpreted the message as was intended, murdering the monarch with a calculated cunning.

So that there should be no marks of violence on the king's body, they passed a ram's horn with the tip cut off through the anus into the rectum and then thrust a long slender sword (some say red hot irons) up through the ram's horn into the king's intestines. In spite of the thickness of the castle walls, the monarch's shrieks could be heard in the village. His body was embalmed and exposed to the public so that all could verify that there were no marks of violence on the royal corpse. This must be the earliest reference to a ram's horn used as a proctoscope and a unique example of a perforating injury to a royal rectum.

His son, Edward III, had four royal physicians and added surgeons to the establishment. One of them was the famous John of Arderne. Another surgeon who served his king was Thomas Morstede, who accompanied Henry V on his invasion of France and was with the king at the Battle of Agincourt in 1415. It is recorded that William Bradwardyne, a second surgeon, and Nicholas Colnet, a field surgeon, were with Morstede and that they took with them artificers to make and repair surgical instruments. Morstede himself was a very active member of the numerically small Surgeons' Guild. He was appointed supervisor of surgery and surgeons for the City of London and in 1423 in conjunction with Dr. Gilbert Kymer he formed the unsuccessful Company of Physicians and Surgeons.

As early as Henry III's reign there are references to sergeant surgeons. Two claimants to the title of the first sergeant surgeon appear in his reign —the first was Henry de Saxeby, who was appointed in 1251, the other was Thomas de Weseham. In 1260, as a reward for his services, the king granted him for life, in return for 100 shillings a year, the die to mint coins. A silver penny coined by him between 1260 and 1270 is in the British Museum and they have kindly allowed me to reproduce it (Fig. 1). This silver penny is faced with the head of Henry III and inscribed round the edge, Henricus Rex III. On the obverse, there is a long cross with pellets to fill in the design and the inscription, Thomas on Lund. This, then, may be the earliest relic of a sergeant surgeon.

I do not propose to bore you with a tabulated list of sergeant surgeons from 1461 to the present time, but I wish to tell you now a little about the more famous sergeant surgeons who received their appointments between 1461 and 1745. During this period most of them were Barber Surgeons and they and their lesser colleagues were indeed the founders of anatomical study and the pioneers of English surgery.

As John Hunter is to the Royal College of Surgeons, so Thomas Vicary is to the Company of Barbers. During one of Henry VIII's journeys from Dover to London, he spent the night at Canterbury and, being greatly troubled with an ulcer on his leg, he called in a practitioner in the district —Thomas Vicary, in whose honour this lecture is named (Fig. 2). Vicary's personality and his success in treating Henry's leg finally led to his appointment as Sergeant Surgeon. This appointment he received in 1530, the year he became Master of the Barbers' Company for the first time.*

Fig. 1. Thomas de Weseham's silver penny.

He must have been a likeable and tactful surgeon and a skilful administrator, for not only did he survive the whole of Henry's reign as a court official—a reign during which heads and bodies parted company with alarming frequency—but he held his appointment through the reign of Edward VI, Mary Tudor and, for a short peroid, in Queen Elizabeth's reign.

He is depicted in the famous Holbein painting as receiving from His Majesty the Charter uniting the Guild of Surgeons with the Barbers' Company and it was no doubt due to his foresight and persuasion that this important union took place.

Although at this time great strides were being made on the Continent in dissection of the human body and the study of anatomy, at home dissection and the teaching of anatomy was almost unknown. In the Charter of Union of the Barbers and Surgeons was a clause which gave them access to four bodies a year from criminals executed at Tyburn. These bodies were to be used for dissection or in any other way for the advancement of anatomy and surgery. As a result of this, the first regular

* He was master of the Barber Surgeons' Company in 1541, 1546, 1548 and 1557.

courses in England of lectures and demonstrations in anatomy were instituted.

The Barber Surgeons' Hall thus became the only place in England where dissections could be performed legally—a privilege only granted 25 years later to the Royal College of Physicians and to Gonville Hall,

Fig. 2.

Cambridge. There is no doubt that Thomas Vicary himself was the first reader in anatomy and his book *A Profitable Treatise of the Anatomie of Man's Bodie* was the first anatomy book to be printed in English.

As a proctologist and because my interests have at some time been directed to the study of the anatomy of the anal sphincters, I referred to

this subject in Vicary's book. Writing on the intestines, he states : " Here it is to be noted that there be six portions of one whole gut. The sixth and last is called the rectum, and he is ended in the fundament, and hath in his nether end, four muscles—to holde, to open, to shutte and to put out." There were, however, no precise instructions as to how each muscle could be identified or how one could avoid cutting the vital muscles which held and shut up.

Vicary's name will forever be associated with St. Bartholomew's Hospital, the City's oldest hospital. He was not appointed surgeon to the hospital, as is often stated, but became one of the six new Governors of the hospital when Henry VIII handed over St. Bartholomew's to the City of London. Soon afterwards he was appointed Resident Surgical Governor of the hospital and remained so until his death. In the Minutes of the hospital there are frequent references to his kindnesses and care of the poor of the City. He was a man equally at home with kings and commoners.

Vicary died four years after the accession of Queen Elizabeth. During her long reign four sergeant surgeons were appointed—Richard Ferris, Robert Balthorpe, William Gooderus and George Baker. Richard Ferris succeeded Vicary. Little is known of him but he is the only one with a merry twinkle in his eye amongst the rather solemn looking company of Barber Surgeons kneeling before Henry VIII in the Holbein painting. Holbein's painting belongs to the Barber Surgeons and now hangs in Hampton Court as the Barbers' Hall, which had survived the Great Fire of London in 1666, was destroyed in the blitz of 1941. A copy of this picture, ordered by James I in 1618, was purchased by the Surgeons' Company from Monsieur Desenfans in 1786 for fifty guineas and now hangs in the Royal College of Surgeons. It is not an exact copy and unfortunately the portrait of Richard Ferris has been omitted.

Next came Robert Balthorpe, who was a contemporary of the famous anatomist, Dr. Caius. There is a handsome monument on the south wall of the Church of St. Bartholomew the Less with this inscription to his memory—

> " Here Robert Balthorpe lies entombed, to Elizabeth our Queen,
> Who Sergeant of the Surgeons sworn, near thirty years hath been.
> He died at sixty-nine of years, December's ninth the day,
> The year of grace eight hundred twice, deducting nine away.
> Let here his rotten bones repose, till angel's trumpet sound
> To warn the world of present change and raise the dead from ground."

The Barber Surgeons especially remember Balthorpe, who was twice their Master, because in his year of mastership, William Harvey, Clarencieux King of Arms, granted supporters to the arms of the Barber Surgeons' Company. " Two lynxes in their proper colour, about their necks a crown, with a chain argent pendant thereat " (Fig. 3).

Of William Gooderus we know little except that he served with William Clowes in the Low Countries and that the results of treatment of gunshot

wounds by these two fine surgeons were quite exceptional for their time. George Baker was the last of the Elizabethan sergeant surgeons and perhaps an incident in his life may illustrate that Barber sergeant surgeons were spirited men with a descriptive vocabulary and the necessary courage

THE Armorial Bearings of the Worshipful Company of Barber Surgeons were granted by Sir Gilbert Dethick, Garter.
Robert Cooke, Clarenceux and William Flower, Norroy, 2 June 1569, and are recorded in the Visitation of London, 1634
DE PRÆSCIENTIA DEI
College of Arms, London, June 1940
Chester Herald & Registrar

Fig. 3. Coat of Arms of Barber Surgeons' Company.

to back it up. William Clowes, who held a minor surgical appointment to Queen Elizabeth, apparently referred to George Baker as "a great bugbear, a stinging gnat, a venomous wasp and a counterfeit crocodile," and in the Minutes of the Company of March, 1577, there is an entry—"Here at this Court was a great contention and strife spoken of and ended between George Baker and William Clowes, for that they both, contrary to order and the good and wholesome rules of this house, misused each other and fought in the fields together. But the Master, Wardens and Assistants, wishing that they might be and continue loving brothers, pardonned this great offence in hope of amendment." The outcome of the brawl, and whether conciliation was achieved, remain unrecorded.

With the Union of the Crowns in 1603, James VI of Scotland became James I of England. As might well be expected, he brought with him his own surgeon from Scotland, Gilbert Primrose, who was promptly appointed Sergeant Surgeon. Gilbert Primrose was a prominent member of the Edinburgh Barber Surgeons, being deacon or kirkmaister on three occasions. I would like to be able to tell you that Primrose became

Master, or at least a member, of the Barber Surgeons of London, but I can find no evidence that he achieved the distinction of being a Barber Surgeon of both cities. He is notable, however, for being the only Barber Surgeon of Edinburgh to become Sergeant Surgeon.

An interesting relic of Gilbert Primrose can be seen at the Royal College of Surgeons of Edinburgh. It is a heavy, bronze, chemist's mortar, on which is inscribed his name and the date, 1569. This mortar had been turned up by a ploughman in the borders and had probably been left there by Primrose while attending to casualties resulting from the frequent clashes between the English and the Scots.

Christopher Frederick, the other Sergeant Surgeon to James I, was twice Master of the Barber Surgeons, in 1609 and 1616. He was a stranger born and his freedom of the City and of the Barber Surgeons' Company had been given him at Elizabeth's request. He was constantly at cross purposes with the Court, to such an effect that a resolution was passed in 1605 that in future no alien should be admitted to the Court. This resolution, however, was subsequently rescinded. His one claim to fame is that his son, Sir John Frederick, became Lord Mayor of London in 1661.

James's Sergeant Surgeons would have treated their king for a fractured collar bone, renal stones and bleeding haemorrhoids. There was much in James that was unpleasant: he not only overdrank, but was no connoisseur of wine; having few teeth, he bolted his food in an unchewed state; and he was a homosexual. Many of his irregular affections were undoubtedly due to his deprivations in early life. He was bereft of his mother's care as an infant and was suckled by a drunken wetnurse.

In spite of all this, we must remember that he was a medical benefactor. He founded the Royal Faculty of Physicians and Surgeons in Glasgow in 1599, and, in 1617, the Society of Apothecaries in London. It is interesting that his dislike of smoking led him to write a pamphlet entitled *A Counterblast to Tobacco*. If there is anything in the present controversy over smoking and disease of the lungs, James was well ahead of his time.

William Clowes received his appointment as Sergeant Surgeon at the time of accession of Charles I. That he was appointed Sergeant Surgeon at the comparatively early age of 45 was undoubtedly due to the court influence of his father, who, as already mentioned, had been surgeon to Queen Elizabeth and James I. William Clowes, senior, was probably the greatest of the Elizabethan surgeons and his books and writings are certainly the best of the Elizabethan age. He wrote on venereal disease, tuberculous glands of neck and burns due to gunpowder. He saw service in the army at Arnhem and Nijmegen and served with the fleet which defeated the Spanish Armada.

William Clowes, the younger, was apprenticed to his father as a Barber Surgeon and although he became a sergeant surgeon and was a Master

of the Barber Surgeons (positions which his father did not attain) it is the father who contributed most to surgical progress.

Richard Pyle, who followed William Clowes as Sergeant Surgeon, probably owed his appointment to the fact that he married the Sergeant Surgeon's niece.

It was during the time of these two sergeant surgeons that the Barbers added the famous anatomy theatre to their buildings in Monkwell Street. As a result of William Harvey's discovery of the circulation of the blood there had been a great increase in the interest in anatomy. The demands for private dissections and anatomies at the Barbers' Hall had been growing to such an extent as to be unmanageable and a nuisance to the general running of the Company. The Master and Wardens had therefore decided to build an anatomy theatre and engaged Inigo Jones as the architect.

Not only did the Barbers build an anatomy theatre but they took the opportunity of tightening up their regulations in general. Attendances at public anatomies had become slack—surgeons came improperly dressed and did not sit at their allotted seats, but mixed with the public. In future, however, indiscretions of this sort were to be treated by a fine. Everything seemed set for a prosperous period and for recouping the heavy expenses incurred in establishing their anatomy theatre when, four years after the opening of the theatre, Civil War broke out. The public anatomies were abandoned, the Barbers' Company was on the verge of bankruptcy, and most of its possessions were sold or pawned.

With the end of the Civil War and the execution of Charles I there was an eleven-year period when there was no monarch to serve and so no sergeant surgeons. The first line in the declaration of a freeman of the Company of Barber Surgeons reads, " You shall declare that you shall be true and loyal to our sovereign lord, the King " and I have no doubt that at the Apothecaries and the Royal College of Physicians similar declarations had to be made. Assuming that all physicians and surgeons had sworn such allegiance to the King, how then did Oliver Cromwell obtain medical and surgical attention? Cromwell's policy was not to oppress the Royalists, provided they did not oppose his Government, and surgeons and physicians who had served the Royalist forces were allowed to practise in London notwithstanding having been on the " wrong side ". Cromwell himself had no objection to being treated by a royalist so long as he was a good physician. He suffered from stone and during an attack he called in James Moleyns to attend him as he was the foremost authority on the condition. William Treue in *A Doctor at Court* gives an amusing account of the consultation. " Moleyns made no effort to conceal his royalist allegiance. His handling of the case was so successful that Cromwell thanked him with the words, ' Ask for anything you wish and you shall have it.' Moleyns replied that he wanted nothing. He

had not taken on the case out of a liking for Cromwell but because he had no alternative. All he wanted, he said, was something to drink. He was taken down to the cellar where he took a mighty swallow of wine—and roared out a toast to King Charles. The incident naturally came to the ears of Cromwell who, however, gave orders that the doctor was not to be punished since he was out of his mind. The next day he sent Moleyns £1,000, with the request that he should accept it in the name of King Charles."

Thomas Trapham was apparently Cromwell's surgeon, had served with Cromwell's army during the war and was a bitter enemy of Charles I. He wrote a medical report on the king's execution and when he sewed the severed head back on to the body before burial he remarked that it was the head of a goose. Nothing is known to the credit of Thomas Trapham.

On the restoration of the monarchy, several surgeons were competing for royal favours. There was Richard Pyle and Humphrey Painter, who had already held surgical appointments to the royal household under Charles I, and there were two surgeons, John Knight and Richard Wiseman, who had been closely associated with Charles II during his exile abroad and who had fought on the royalists' side. Charles, rather than hurt anyone's feelings, increased the establishment of sergeant surgeons from two to three and also created new titles. Thus it came about that Richard Pyle, Humphrey Painter and John Knight were appointed Sergeant Surgeons at the beginning of the reign. Richard Wiseman, however, had to be content with the new title of Surgeon in Ordinary for the Person until twelve years later when Painter died and Wiseman himself became one of the sergeant surgeons (Fig. 4).

John Knight and Richard Wiseman were the two outstanding sergeant surgeons of Charles II's reign. They had entirely different backgrounds but each was distinguished in his own particular way. Wiseman was born in London but his parenthood was uncertain. There is every reason to believe that he was the illegitimate son of Richard Wiseman, Bt., of the well known Essex family. He was apprenticed to the Barber Surgeons at about the age of 18 and his first professional appointment was as a surgeon to the Royal Dutch Navy. During the Civil War he had served under Charles I in the West Country. He was at the taking of Weymouth Forts and at their retaking, and when the royalist troops were finally defeated he embarked with the Prince of Wales from Falmouth Harbour and sailed to St. Mary's in the Scilly Isles. It was probably due to Lord Hopton, who was in command of the royalist forces and who had noted Wiseman's ability as a surgeon and his care of the wounded troops, that Wiseman received his recommendation to the Royal Prince. He was with the royal household in Jersey, France and Holland and returned with Prince Charles to Scotland. He fought with the King's armies in the engagements at Stirling, Musselburgh and Dunbar. He took part in the march of his forces into England, where they were defeated at the Battle of

Worcester—Cromwell's crowning glory. Wiseman, with many others, was taken prisoner and confined at Chester. He was granted his release and made his way back to London and, on becoming enrolled as a freeman of the Barber Surgeons' Company, he put up his plate in Old Bailey at the sign of the King's Head and started to build up a fine practice. But just as everything seemed to be going smoothly for Wiseman he was called to attend a royalist prisoner in the Tower of London and, while successful in treating his patient, he was probably indiscreet both in what he said and

Fig. 4. Richard Wiseman, A.D. 1660.
(From a miniature in the possession of His Grace the Duke of Rutland.)

wrote for before he knew what was happening he was implicated in a plot for the prisoner's escape and, worse still, the assassination of Cromwell. He was imprisoned at Lambeth, then released, but because he was under constant suspicion he now joined the Spanish Navy and for three years served as a sea surgeon in the West Indies.

Wiseman wrote a remarkable book entitled *Eight Surgical Treatises*, his subjects being tumours, ulcers, diseases of the anus, of the King's Evil, of wounds, of gunshot wounds, of fractures and luxations, and of lues

veneria. In his book he described not only his successes but his failures. He stressed the importance of consultations between surgeons and the observing of each other's methods. By his example he did a great deal to put the surgeons on the same level as the physicians.

For the last twenty years of his life he was an invalid, suffering from disease of the lungs, and he finally died at Bath from a haemoptysis. He was married twice and it is interesting to note that his second wife, Mary Mauleveior, was the grand-daughter of Sir Thomas Mauleveior, first baronet, who had attached his signature to the death warrant of Charles I. It seems strangely inconsistent that such a staunch royalist as Wiseman should marry into the family of a regicide. Wiseman was Master of the Barber Surgeons in 1665, the year of the Great Plague, and delivered a lecture on fractures at the Barber Surgeons' Hall just before the Great Fire of London.

John Knight, in contrast to Richard Wiseman, came from an old established family from Winwick All Saints, Huntingdonshire, claiming its descent from the burgesses of Calais. He was admitted to Gonville and Caius College, Cambridge, elected to a scholarship, took his degree and was ordained by the Bishop of Peterborough as a deacon and priest. Little is known of Knight until he bound himself as an apprentice to Edward Moleyns, a surgeon at St. Thomas's Hospital, surgeon for cutting of the stone to St. Bartholomew's, and a freeman of the Barber Surgeons' Company. Edward Moleyns himself was a very fine surgeon and in fact Wiseman became his assistant on his return from his imprisonment in Chester and paid tribute to his skill as a surgeon. I have a feeling that it must have been the same Moleyns who was called in to attend to Oliver Cromwell for the stone, although the Christian names in the reference books are different, for there is a similarity not only in the skill for treating for stone but also in temperament between the two Moleyns. You will recollect the blunt and forthright way in which James Moleyns spoke to Cromwell. In the *Annals of the Barber Surgeons* there is a record that Edward Moleyns was summoned to the Court of Assistants of the Barbers, being in dispute with one of his fellow surgeons. When the decision was given against Moleyns we learn he was fined for using bad language and a year later it is recorded that he stood in the face of the Court with his hat on his head and his arms folded on his side and declared he would do no obedience to the Court and swore on God's wounds he would submit to no man living. For this contempt he was fined forty shillings and was not allowed to hold any office in the Company.

At the outbreak of the Civil War, Knight joined the royalist forces and was present at the Siege of Leicester. The Royalists' stronghold fell and Knight for a time returned to London but later retired to King's Lynn. From there he fled to Holland and joined Prince Charles and was with him throughout his exile. On the restoration of the monarchy, honours were showered upon him. He became Sergeant Surgeon to Charles II and this

appointment led to his mastership of the Barber Surgeons in 1663. Finally he was appointed Surgeon General to the Forces in England and Wales. Knight, unlike Wiseman, enjoyed good health and lived to the age of 80.

Fig. 5. Silver gilt grace cup and cover.

Three possessions of the Barbers' Company remain as tangible evidence of John Knight's close association with his company.

(1) The Silver Gilt Grace Cup and Cover presented to the Company by Henry VIII (Fig. 5). John Knight during his mastership in 1669 had the cup repaired and a case made for it and, during his second period of mastership, caused a plate to be fixed within the cover of the cup, inscribed as follows —

Henrici R. Munificentia Ne posteris ignota maneat.
Iohannis Knight
R.C.P.
1678.

" Lest it remain unknown to posterity (this cup is) of the generosity of King Henry " (Fig. 6).

Fig. 6. Plate on inner side of cup cover commemorating royal gift.

(2) A Parcel Gilt Standing Cup and Cover, known as the Royal Oak Cup (Fig. 7). Charles II, with the object of rewarding loyal adherents, instituted a new order of knighthood to be called the Order of the Royal Oak. The knights of the Order were to wear, hanging on a ribbon about their necks, a silver medal depicting the king in the oak. The cup had been fashioned especially to be used at a banquet celebrating the creation

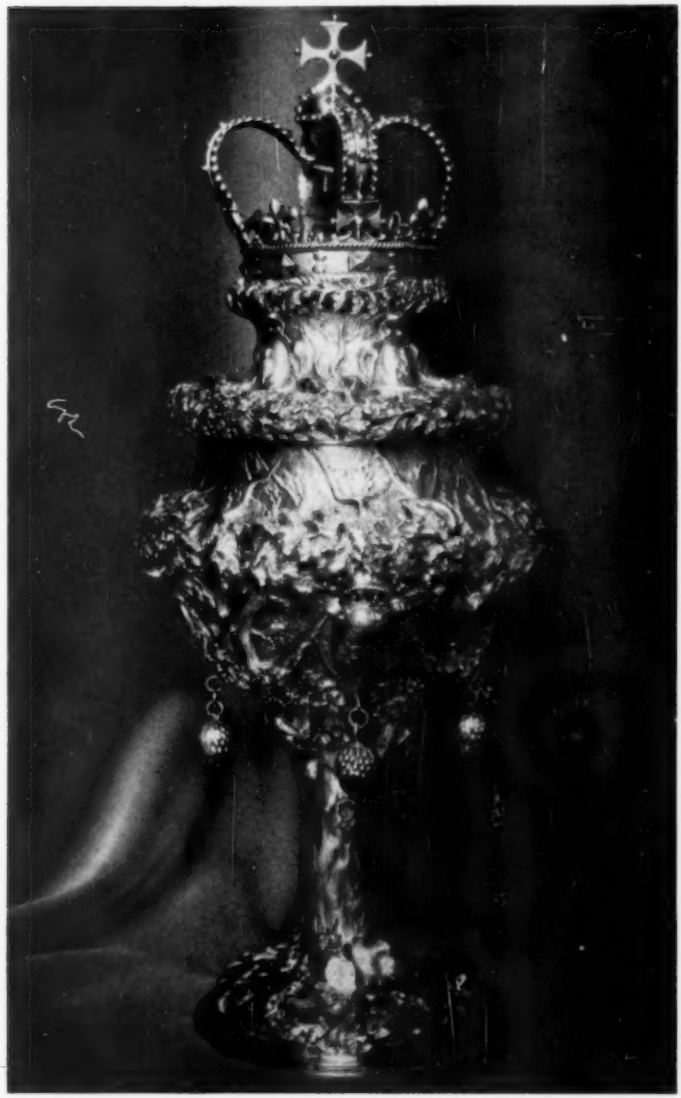

Fig. 7. The Royal Oak or Boscobel Cup.

of the Order. The abandonment of the project, however, left the cup without a purpose. Around the bowl of the cup are four shields from which hang acorn bells. One shield depicts the Company's arms, another the crest, on the third is inscribed " Donum Munificentissimi Regis Caroli Secundi Anno 1676 " and on the fourth shield " Impetrantibus Chirurgis Regiis Johanne Knight Chirurgio Regis Principali et Jacobo Pearse Eodem Anno Societatis Magistro," thus recording that the cup was presented to the Barbers on the petition of John Knight, Sergeant Surgeon and Master of the Company.

These two possessions of the Company bearing witness to John Knight are, of course, familiar to some of you. The third, to which I shall refer, is perhaps a stranger.

A silver-mounted shagreen instrument box, which came into the Company's possession in 1941, undoubtedly belonged to John Knight—his initials are on the lid, together with the Company's arms (Fig. 8). The box, alas, was empty. Fifteen years later, while I was in the waiting room of

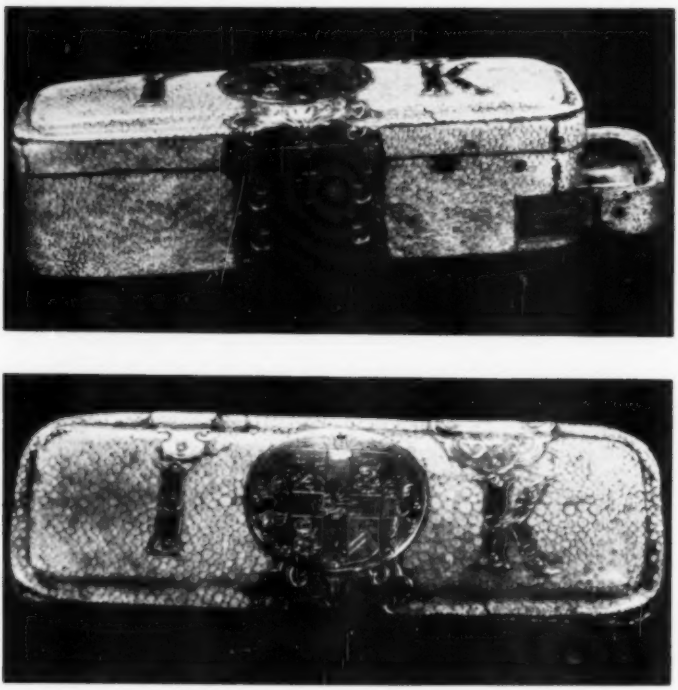


Fig. 8. John Knight's instrument box.

my dental surgeon, idly turning over the glossy pages of *Country Life* (albeit 18 months old), my eyes suddenly caught sight of a photograph entitled " Surgical Bygones " and there was a shagreen box identical to John Knight's, save for the initials and coat of arms, with the nine following instruments —

(1) Sinus or dressing forceps.
(2) Tongue depressor—very elaborate shape.
(3) Scissors.
(4) Measure for liquids or ointment scoop.
(5) Dental scraper for scaling teeth.
(6) Ointment spreader or spatula—couching knife.
(7) Director probe—ring handle for forefinger—or tongue scraper.
(8) Director scoop.
(9) Caustic holder for lunar caustic—box at end for red oxide of mercury.

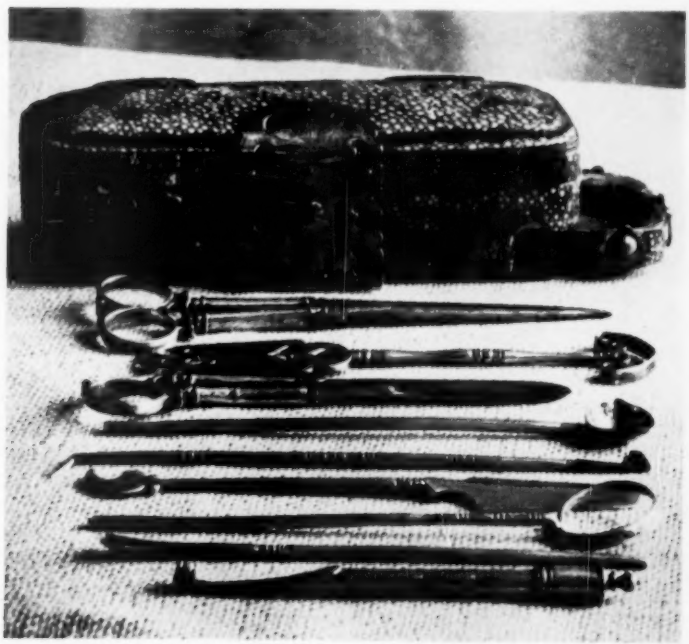

Fig. 9. Mr. Stanley Marling's case with instruments.

This box, with its instruments, belongs to the noted antiquary, Mr. Stanley Marling, of Amberley, Gloucestershire, and he has kindly allowed me to reproduce this picture (Fig. 9).

One of the surgical instruments bears the silver hall mark of 1672, well within John Knight's lifetime. Here, then, by devious routes, we have full knowledge of the instruments (and their container) as used by a surgeon in Charles II's reign.

Thus far we have had no account of a sergeant surgeon operating on his royal charge. Queen Caroline, however, wife of George II, had occasion to require the services of Surgeon John Ranby. Caroline was a slim, pretty girl but in time she put on weight and developed a physique which predisposed her to an umbilical hernia (Fig. 10). Early in November,

*Reproduced by kind permission of "Radio Times Hulton Picture Library".*

Fig. 10. Queen Caroline, wife of George II. John Ranby's patient.

1737, the hernia incarcerated and finally strangulated. Ranby and his colleague, Buissière, were called in to treat the Queen who was then 55. Buissière was in favour of an attempt at enlarging the opening in the abdominal wall and trying to replace the gut—a procedure no one would question today with asepsis, anaesthesia and modern illumination. Ranby's opinion, however, was that if this were attempted the intestines would, far from being replaced, prolapse into the bed and he decided on simple incision of the swelling.

Ranby is said to have been a man of strong views, vain disposition and inelegant manners. Even the Queen referred to him as the "blockhead" shortly before submitting to her fatal operation.

"The Queen showed remarkable courage during the operation under the hand of Ranby, who had parted from his wife after a quarrel. When Ranby cut the Queen, to show her contempt for the pain, she asked what he would give to be using his wife in the same manner. . . . At the same time, old Buissière, who was near the age of ninety, and stood by Ranby to direct how to proceed, happened by the candle in his hand, to set fire to his wig; at which the Queen bid Ranby stop awhile for he must let her laugh."

Gangrene set in and in spite of further incisions the intestines ruptured on the ninth day after operation, with a fatal outcome. This fatal outcome, however, did not prejudice Ranby (who was the son of an innkeeper in Southwark) from being appointed Sergeant Surgeon to her husband, George II, in 1743. He was the last Sergeant Surgeon to go into battle, accompanying the king at the Wars of the Austrian Succession, and he was present at the Battle of Dettingen in the same year. This was the last occasion when a reigning monarch went into battle with his army.

Ranby played a leading part in the separation of the Surgeons from the Barbers and at the first meeting of the new Surgeons' Company at the Stationers' Hall, Ranby took the oath as the first freeman of the Company, and then that of Master. In honour of the event he presented a silver cup which is now in the possession of the Royal College of Surgeons.

History often seems remote and impersonal but close associations can sometimes be found between the present and the past.

Two hundred and fifty-six years ago Charles Bernard was Master of the Barber Surgeons (1703). He was distinguished not only as Sergeant Surgeon to Queen Anne (who had 17 children, all of whom died when young—a problem indeed for the physician accoucheur and paediatrician to Her Majesty) but because he was the first surgeon to collect an extensive library. His great friend and confidant was Dean Jonathan Swift, the author of *Gulliver's Travels*. I like to think that I have shared the enjoyment of the tales of the pygmies of Lilliput, the giants of Brobdingnag, the quacks of Laputa and Houyhnhnns, with another Master of the Company who probably played a part in the composition of this well known travelogue.

The closest associations, however, of this sort I have found while writing this lecture have concerned John Knight, Sergeant Surgeon to Charles II. Firstly, I recollect with pleasure the acquisition for my Company of Knight's own instrument case and then the strange circumstances leading up to the identification of its contents which I have already related. Lastly, through William Wright (Vicary Lecturer in 1925 and 1934, Professor of Anatomy of my old hospital, The London) and John Knight of the Barber Surgeons, the tale of the Princes in the Tower comes to life (Fig. 11).

The fate of the boy king Edward V and his brother Richard, Duke of York, is summarised in this old account: " Miles Forrest and John Dighton about midnight (the silly children lying in their beds) came into the chamber and suddenly, lapping them up among the clothes so to be

*Reproduced by kind permission of " Radio Times Hulton Picture Library".*

Fig. 11. The Princes in the Tower and Professor William Wright.

wrapped their keeping down by force the feather bed and pillows hard into their mouths that within a while smothered and stifled their breath failing they gave up to God their innocent souls ".

Their bodies were hidden under a staircase in the Tower of London. In 1674, nearly 200 years later, John Knight witnessed the discovery by workmen of a chest hidden under a stairway in the White Tower, containing the bones of boys in their teens with pieces of rag and velvet about them. Being fully recognized to be the bones of the two princes, foully murdered by Richard III, they were carefully put aside in a stone coffin. It was due to the perseverance of Sergeant Knight that, four years later, the bones were re-interred at Westminster Abbey in a marble urn designed by Christophen Wren. Nor does the story end here for in 1933 (255 years after this re-interment) the contents of the urn were scientifically examined by Professor Wright and Mr. Lawrence Tanner, Keeper of the Muniments at Westminster Abbey. It was established by Professor Wright's expert knowledge of the development and ossification of bones, especially of the

axis or second cervical vertebra, that the bones belonged to boys of the exact ages of the two princes. Thus from foul murder and an unknown grave the bones of the little princes have come to a final rest in their rightful place with the kings of England.

I have roamed from Agincourt to Dettingen, from Henry III to George II, from Saxeby to John Ranby, in an attempt to bring back to life those famous men who were Sergeant Surgeons, Barber Surgeons, founders of the study of anatomy in England, pioneers of the art of surgery, and loyal servants of the Crown.

As a practising surgeon with no pretentions to being a historian, I wish to acknowledge that the material for my lecture has been gleaned from the works of other authors, the study of which has made the writing of this lecture such an enjoyable task.

The fact that the lecture was finally prepared is also due to the hard work of others and I am indebted to Mr. Wade and Miss Evans of the Royal Society of Medicine, the Wellcome Historical Medical Library, Mr. Mackie, photographer to St. Mark's Hospital, Mr. Redman of the Royal College of Surgeons, and especially to my secretary, Miss Millis, for their help and encouragement.

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## THE HISTORY OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

The official history of the College has been written by Sir Zachary Cope, F.R.C.S., and is now available from the Librarian of the College, price 63s. a copy, plus postage. The publishers are Anthony Blond, Ltd.

The author has traced the development of the College from a City Livery Company to the progressive surgical institution that it is at the present time. There are biographies of distinguished surgeons and the volume is illustrated with more than 36 pages of plates. The Librarian has contributed a chapter on The Library, and Miss Jessie Dobson has written the history of the Hunterian Museum.

# AMPUTATIONS AND ARTIFICIAL LIMBS

**Lecture delivered at the Royal College of Surgeons of England**
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**by**

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AMPUTATION IS AN important branch of limb-surgery and this art should be learnt by every practising surgeon. The necessity for amputation of part of a limb or a whole limb rests on the judgment of the surgeon, in order to save the life or health of a person suffering from irremediable disease, injury, deformity, paralysis, or threatened spread of the local condition of a diseased limb. When conservative treatment has failed, amputation offers the only solution.

Amputations of the lower limb and upper limb are essentially different in their aims and objectives. The principal function of the lower limb is weight-bearing and locomotion. For this reason the important points are stability, muscle power and movements of the joints. An artificial limb for the lower extremity can be supplied which provides stability and, above all, good cosmetic effects. In the case of the upper limb, the problem is quite different. The upper limb is for prehension, i.e. grasping, carrying and bringing food to the mouth. Therefore, stability is not an essential function of the upper limb, but mobility and adaptability are important. An arm is much more part of a whole " personality " and its loss causes greater psychological trauma. Even the most deformed upper limb is of useful function if mobile. Artificial limbs for upper extremity amputations cannot give a full range of movement and also lack the delicate movements of fingers, wrist and forearm. Sensation cannot be adequately provided and prehension devices are relatively crude. Therefore, a conservative attitude is obviously essential and reconstructive surgery has much more to offer in the restoration of function of the severely crippled hand and arm than is the case with the leg.

A good stump depends on the skill of the surgeon. An ideal stump should be of sufficient length for leverage action and yet provide sufficient space to enable an artificial joint to be incorporated in the artificial limb distal to the stump. The shape should be gradually tapering from the proximal to the distal portion and the scar of the stump should be either posterior or terminal and transverse to the axis of the limb in the coronal plane and there should be no pressure on them.

Leg stumps are of two types :

(1) " End-bearing ", which means that the end of the bone and the tissues covering it should be capable of supporting the body weight, e.g. after joint disarticulations or Syme's amputation.

(2) " Proximal bearing ", that means the weight of the body is transmitted mainly by way of the ischial tuberosity to the socket of the artificial limb. The tibial tubercle and the spread of the tibia and the fibula is preferred in below-knee amputations where ischial bearing is not usually essential, but some weight is also borne upon the soft tissues of the thigh muscles.

For above knee the length of the stump is *very* important. There must always be sufficient space at the end of the stump to enable a mechanical joint to be fitted. If this is not allowed for, a different type of artificial limb has to be worn to the *disadvantage* of the patient.

A good blood supply for the flaps or tissues forming the stump is necessary. Whenever possible the cut end of the bone should be covered by an adequate amount of subcutaneous tissue and deep fascia to prevent the cut bone stretching the skin and subsequent development of bursae and ulceration. By suturing the deep fascia over the end of the bone uniting the agonist and antagonist muscles a distal point of attachment is gained and so prevents shortening of the muscles, thus preserving their power to contract powerfully. In all stumps the movement of the artificial limb is dependent on the mobility of the joints proximal to the stump.

**Problems of growth in the stump**

In the case of children, the overgrowth of the cut end of a bone in the stump is a problem. The younger the child at amputation, the more liable is he to develop a " conical stump ". In the upper extremity, growth is a relatively minor problem except in the case of a humeral stump. In a below elbow stump the main growth centre has been removed and re-amputation is rarely required. In the lower extremity, wherever possible, bone section of the femur is to be avoided until the femur has grown long enough to provide a stump of optimal length for adult life. The presence of the condyles of the femur in children produces a bulbous end of the stump, but with the passage of time and different rates of growth these lose their prominence, and in adult years this stump becomes less bulbous, allowing the fitting of a standard above-knee amputation socket, but with the added advantage of it being an end-bearing stump. Therefore, for these cases a disarticulation of the knee is most valuable. In a below-knee amputation, the bones grow more rapidly than the soft tissues and, therefore, give rise to " conical stump ". The fibula has a sinister reputation for bony overgrowth in a stump. Since the growing centres are proximal to the section, growth is to be expected; but why the fibula grows more than the tibia is not fully understood, although the centre of ossification of the growing end of the fibula appears later than the other end.

The advantages and disadvantages of end-bearing and proximal-bearing stumps are as follows :

**End-bearing stumps**

1. The end of the stump is covered by skin naturally adapted for weight bearing.

2. Vascularity of the skin is very good owing to the anastomosis of many arteries around any joint. This is therefore an additional indication for vascular disorder cases, e.g. atherosclerosis.

3. The ends of the long bones are bulbous and so the stump is rather wide and square at its distal end. The length of the stump adds leverage action, and the bulbous end of the stump is suitable for end bearing, exerting pressure actually on the bottom of the socket. Well developed femoral condyles help to " anchor " the prosthesis, prevent its rotation on the stump, and reduce piston action.

4. The maximum advantage of an end-bearing stump (in disarticulation) is with the young amputee child, because the growth of the bone takes place *pari passu* with that of the soft tissues resulting in a stump of sufficient length without tension on the skin (as in the conical stump). The possible necessity of having to shorten these stumps after cessation of growth is no serious disadvantage.

5. Another advantage of an end-bearing stump is that it can be fitted with any primitive form of artificial appliance, such as a wooden peg, etc., and is therefore suitable for parts of the world with poor limb-fitting facilities.

6. A further important advantage is that weight bearing is transmitted naturally through the acetabulum and not unnaturally by way of the ischial tuberosity. This preserves normal proprioceptive impulses which give a normal feeling of the position of the limb in space and so help to give " balance ".

In a word, an end-bearing leg stump is very useful particularly for the young and the old and the blind.

**Proximal-bearing Stumps**

If a femoral bone section has to be performed a proximal-bearing stump is provided and the artificial limb being moved from the proximal joints does not produce pressure sores at the end of the stump and the stability, posture and locomotion of the patient is still satisfactory. The muscle power of the stump should be strong and this should be ensured by the help of the physiotherapist. The other advantage is the room available for the prosthetic joint at the correct levels. In short, for an active person between the age of twenty and sixty years, a proximal-bearing stump is quite satisfactory; the disadvantages being the growth in the young.

**Indications for amputation**

1. Trauma with irreparable vascular injury or crush-syndrome.
2. Gangrene : (*a*) Vascular
   (*b*) Infective including gas gangrene } Diabetic
   (*c*) Thermal, electrical and chemical.
3. Rarely chronic infection (osteomyelitis and tuberculosis).
4. Neoplasms.
5. Incorrigible, disabling or disfiguring deformities (congenial, paralytic, inflammatory).
6. Stump shortening.

**Reasons for amputations during the year 1958 (presenting at the Limb-Fitting Centre, Queen Mary's Hospital)**

**Arm amputations**

| *Trauma* | *Single* | *Double* |
|---|---|---|
| War—Forces ... ... | 7 | |
| ,, Civilian ... ... | 1 | |
| Industrial ... ... | 164 | 2 |
| Traffic—Pedestrian ... | 9 | |
| ,, Driver or Passenger | 16 | |
| Public Transport—Road | 2 | |
| Rail | 3 | 2 |
| Home ... ... ... | 12 | 4 |
| Sport ... ... ... | 7 | |
| Other ... ... ... | 17 | |
| *Disease* | | |
| Osteomyelitis ... ... | 4 | |
| Arteriosclerosis ... ... | 5 | |
| Tuberculosis ... ... | 1 | |
| Diabetic ... ... | 0 | |
| Other Gangrene ... ... | 5 | |
| Malignancy ... ... | 33 | |
| Poliomyelitis ... ... | 1 | |
| Other Diseases ... ... | 10 | |
| *Congenital* ... ... | 24 | |
| TOTALS | 321 | 8 |

| *Sites* | |
|---|---|
| Forequarter ... ... | 8 |
| Disarticulation : Shoulder ... | 14 |
| Up to 8 ins. from Acromion | 54 |
| Over 8 ins. from Acromion | 45 |
| Through Elbow ... ... | 3 |
| Up to 7 ins. from Olecranon | 82 |
| Over 7 ins. ... ... | 21 |
| Disarticulation : Wrist ... | 11 |
| Transcarpal ... ... | 4 |
| Part Mutilated Hand ... | 79 |
| TOTAL | 321 |

**Leg amputations**

| *Cause* | | *Single* | *Double* | *Total* |
|---|---|---|---|---|
| War—Forces ... ... | | 29 | 1 | 30 |
| „ Civilian ... ... | | 3 | 0 | 3 |
| Industrial ... ... | | 164 | 10 | 174 |
| Traffic—Pedestrian ... | | 74 | 4 | 78 |
| „ Driver or Passenger | | 151 | 1 | 152 |
| Public Transport | Road ... | 10 | 0 | 10 |
| | Rail ... | 17 | 7 | 24 |
| | Water ... | 0 | 0 | 0 |
| | Air ... | 0 | 0 | 0 |
| Home ... ... ... | | 18 | 1 | 19 |
| Sport ... ... ... | | 14 | 0 | 14 |
| Other ... ... ... | | 18 | 3 | 21 |
| | Trauma Total ... | | | 525 |
| *Disease* | | | | |
| Osteomyelitis ... ... | | 85 | 1 | 86 |
| Arteriosclerosis and Thrombosis | | 625 | 48 | 673 |
| Tuberculosis ... ... | | 28 | 0 | 28 |
| Diabetic Gangrene ... | | 333 | 12 | 345 |
| Other Gangrene ... ... | | 166 | 7 | 173 |
| Chronic Varicose Ulceration | | 67 | 0 | 67 |
| Malignancy ... ... | | 180 | 0 | 180 |
| Poliomyelitis ... ... | | 17 | 1 | 18 |
| Other Diseases ... ... | | 73 | 4 | 77 |
| | Disease Total ... | | | 1,647 |
| Congenital ... ... | | 36 | 7 | 43 |
| TOTAL | | 2,108 | 107 | 2,215 |

**Sites of leg amputations**

There is an increasing tendency among surgeons to perform below-knee amputation for diabetic gangrene. In my opinion this should only be done where there is demonstrable angiopathy of the larger proximal vessels. The test will be when we follow the fate of these amputations when subjected to limb wearing. This will be done after a suitable interval. If we compare amputations for diabetic gangrene with those for arteriosclerotic gangrene in corresponding age groups, we find that sites were chosen as follows :

| | *Disarticulation at Hip Joint* | *Above Knee* | *Disarticulation at Knee Joint* | *Below Knee* | *Syme* |
|---|---|---|---|---|---|
| Diabetic (333) | 1 | 126 | 14 | 190 | 2 |
| Arteriosclerosis (625) | 1 | 450 | 12 | 161 | 1 |

The percentages of below-knee amputations in each group :

| | *Per cent.* |
|---|---|
| Diabetics ... | ... 57 |
| Arteriosclerotics | ... 26 |

**Leg cases—site of amputation**

| | *Single* | *Double* | *Total* |
|---|---|---|---|
| Hind Quarter ... ... | 18 | 0 | 18 |
| Disarticulation Hip ... | 48 | 0 | 48 |
| Up to 11 ins. (above knee) ... | 638 | 62 | 700 |
| Over 11 ins. (above knee) ... | 451 | 55 | 506 |
| Through knee ... ... | 65 | 5 | 70 |
| Up to 5½ ins. (below knee) ... | 473 | 41 | 514 |
| Over 5½ ins. (below knee) ... | 372 | 32 | 404 |
| Syme ... ... ... | 39 | 18 | 57 |
| Chopart ... ... ... | 4 | 1 | 5 |
| Lisfranc ... ... ... | 0 | 2 | 2 |
| TOTAL | 2,108 | 216 | 2,324 |

**Types of amputation**

**Provisional**

When the surgeon is confronted with a case where primary healing is unlikely to occur he should, when bone section is necessary, perform the amputation as low as possible. It is unwise in such a case to amputate at the site of election because the scar resulting from an infected wound is often unsatisfactory and requires re-amputation. Such a re-amputation is no great disadvantage provided there is enough length available. The limiting factor in deciding on the level of such an emergency operation is the amount of skin present to allow cover of the stump without undue tension of flaps. Only in exceptional circumstances, when the minimum length of a useful stump is reached, is it justified to leave the end uncovered, to be dealt with later by laborious plastic surgery.

Guillotine amputations have been rendered unnecessary by the advent of antibiotics. Skin traction after guillotine amputations as a rule proves unsatisfactory, and when an unhealed area is subsequently grafted this, too, does not provide a durable stump. Flaps should always be cut as in a definitive amputation, and lightly sutured with a few skin sutures, or they can be left fully open—to be closed by delayed primary suture in 4–5 days. Excellent drainage can be obtained in these circumstances. This does not leave a huge raw surface and secondary suture becomes unnecessary.

**Definitive**

Definitive amputations are those for which no further operative procedure is expected and after which an artificial limb can be fitted to achieve the best results for the patient. The general principles of such an amputation are discussed under each heading. The main features, however, are that the stump should be as nearly as possible of the optimum length, that the skin flaps should be healthy and that the scars should be avoided over areas subjected to pressure when an artificial limb is worn.

**Types of stump**

Amputation stumps can be divided into two types :

(1) End-bearing stumps in which weight is borne through the end of the stump and where the scar should not be on the end of the bone. In these stumps the bone end should be solid (cancellous) and not hollow and should therefore be cut near or through an articular surface.

(2) Proximal-bearing stumps, in which the weight is mostly distributed through the proximal tissues and at suitable bony areas which are proximal to the site of the amputation. In these, the scar may be at or near the end of the bone, but preferably not on the anterior aspect.

It is possible to supply an artificial limb for almost any stump, but it is quite another matter to supply one with good function. This depends on : the co-operation of the patient, the concomitant injury or disease, the most suitable length of stump and full movement of the joint above the stump.

The qualities of an ideal stump should be :

(i) Minimal distortion of the normal contours of the limb consistent with the level of amputation.
(ii) The scar should not be exposed to pressure or traction.
(iii) The scar should not be adherent.
(iv) The skin should be neither infolded nor redundant.
(v) There should be no protruding spurs of bone.
(vi) The stump should have no tenderness.

**General principles of amputation**

*The skin.* Generally, unless otherwise indicated, the skin incision should produce equal antero-posterior, semicircular shaped flaps. In some instances the anterior flap may be longer than the posterior flap, but in Symes Amputation there is a long posterior flap.

*The fascia.* The deep fascia should be reflected with the skin flaps and subsequently sutured before the closure of the wound because this enables the skin to move freely over the deep tissues and prevents its adhering, thus resulting in a mobile scar.

*The muscles.* There is a new trend in favour of suturing agonist and antagonist muscles lightly over the ends of the bone for a measure of weight bearing so relieving proximal weight bearing areas to some extent. In addition, this procedure prevents the muscles from retracting and maintains maximum muscle power, particularly the adductors and hamstrings.

*The bone.* The bone should be divided at the level of the retracted muscles so that the muscles and the bone are flush, except in a thin person or in a patient who has an atrophied limb, when the cut muscles are left a little longer so that they can be sutured over the end of the bone.

*The blood vessels.* These should always be ligatured singly with catgut. Linen thread and other materials should not be used because they are inclined to leave sinuses. Haemostasis must be thorough.

*The nerves.* These should be pulled down gently, shortened slightly and allowed to retract into the depths of the muscular layer. Nothing further is required and no crushing should take place. The terminal end bulbs will be developed between the muscles and cause no trouble.

**Pre-operative preparation**

Where amputation is necessitated by trauma, shock and loss of blood should first be treated. Because in crush injuries dirt and grit are inevitable and there may be much devitalised tissue, prophylactic anti-tetanus serum (1,500 units) and anti-gas gangrene serum should always be given and a broad spectrum antibiotic injection into the buttock administered as a matter of routine. The most suitable at present is Procaine Penicillin 800,000 24-hourly.

**Biopsy for malignancy**

However strong is the clinical or radiological evidence as to the diagnosis of malignancy, it is essential that unequivocal evidence is available before embarking on amputations for malignant growths. Wherever possible the biopsy incision should be placed so that it will not encroach on the standard skin flaps of a subsequent amputation, but be removed with the limb.

**Skin preparation**

Any good acceptable technique may be adopted, but the author prefers the following. After shaving the limb 24 hours before the amputation, skin preparation should be performed by washing the parts on three separate occasions with soap and water and applying Cetavlon followed by surgical spirit. A final preparation should be performed in the operating theatre.

**Anaesthesia**

General anaesthesia is always preferred. The patient should, whenever possible, lie flat on his back with a block supporting the limb a few inches proximal to the operation site.

*Tourniquet.* Whenever possible, a pneumatic tourniquet is applied at a suitable level above the proposed amputation site after the patient has been anaesthetized. Pressure bandaging for ex-sanguination is not used in

cases of neoplasm or infection, and padding is used under the tourniquet to prevent excessive local pressure and damage to blood vessels.

If the tourniquet is attached to the operating table the patient cannot be transferred to the trolley and bed until it is removed.

## UPPER EXTREMITY

The standard forms of amputation are as follows :

(1) The above-elbow; (2) The below-elbow, and (3) Amputations which involve the hand and fingers. In addition to these, other upper extremity amputations include—(4) Disarticulation at the shoulder; (5) Disarticulation at the elbow, and (6) Disarticulation at the wrist.

Except for the fingers and thumb, where it is nearly always considered advisable to retain any part of a digit that still possesses useful function, the standard forms of amputation, as a rule, have considerable advantages over disarticulations, which should be performed only if there is special reason for their adoption (Fig. 1).

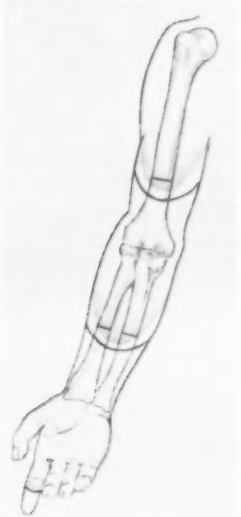

Fig. 1. This diagram shows the conventional amputation sites of the upper extremity, illustrating the lines of bone section, the initial and the ultimate shape of the amputation stump.

## ABOVE-ELBOW AMPUTATION

A humeral stump measuring eight inches (20 cm.) from the tip of the acromion process is free from circulatory defects and provides adequate power and leverage even for heavy work. In addition, there is room for

the fitting of an elbow mechanism which has proved, over the years, to be of great functional advantage. Such a stump is regarded as " ideal ". The minimum length of a useful stump is 5 ins. (12.5 cm.) of humerus to permit the fitting of an above-elbow limb.

**Surgical procedure**

*The incision.* A pneumatic tourniquet is applied to the arm as high as possible. Equal antero-posterior flaps are marked out and cut long enough to give, if possible, a stump 8 ins. (20 cm.) in length, measured from the tip of the acromion process of the scapula.

The incision as described is ideal because the scar will, eventually, be terminal, and thus free from the pressure of the socket. It may be necessary to vary the shape of the incision, according to the surgical requirements of the particular pathological lesion.

*Division of soft tissues and humerus.* The initial skin incision is made down to the deep fascia and the skin then reflected with the superficial fascia before reflecting the deep fascia. The soft tissues are divided down to the bone, after which the muscles retract and the humerus may be sawn across at right angles to its length.

*Haemostasis.* The main vessels are now ligated and the nerves gently pulled down and shortened by about 1 in. (2.5 cm.) so that they fall back into the depths of the wound. The tourniquet is then deflated and any further bleeding controlled either by ligatures or by undermining sutures.

*Closure and drainage.* Finally, the flaps are sutured and the stump is closed with interrupted silkworm gut or nylon. The wound is drained by passing a corrugated rubber drain through the ends of the wound, deep to the already sutured deep fascia.

## BELOW-ELBOW AMPUTATION

*The incision.* A pneumatic tourniquet is applied to the upper arm. Equal anterior and posterior skin flaps are marked out to enable a stump measuring 7 ins. (17.5 cm.) in length from the tip of the olecranon process of the ulna to be fashioned. Care should be taken in positioning the arm to place it in supination on the arm rest, without any torsional strain on it below the elbow joint, otherwise the flaps, after being cut, will be drawn into an oblique position by the natural elasticity of the skin. The skin flaps should include the deep fascia.

*Exposure and division of soft tissues.* The skin and fascia flaps are freed and turned back with the superficial fascia, before reflecting the deep fascia. The tendons, muscles and other soft tissues are then cut transversely to the bone.

In practice it is found that the most suitable site is where the majority of the muscle-bellies become tendons. The skin and fascia are retracted by an assistant.

*Division of radius and ulna.* After division the soft tissues retract. The saw is then inserted and the bones are divided. The main blood vessels are identified and ligated and the main nerves gently pulled down and cut across at a higher level.

The muscles in a wasted limb can be cut a little longer than the bone so that they can be sutured over the end of the bone.

The muscles, having retracted, should be cleared by a periosteal elevator before dividing the bone so that the line of division of the saw is neat and symmetrical.

*Haemostasis.* After ligating the main vessels the cut-end of the stump should be covered with a large dry gauze pack and pressed firmly while the tourniquet is released. Any bleeding vessels that remain can then be ligated.

*Manual pressure.* After all bleeding points have been ligated, pressure is applied to the forearm below the elbow joint to see if any further bleeding takes place. The flaps are then placed in position preliminary to suturing the deep fascia.

*Closure and drainage.* The flaps are united and the stump is closed with interrupted silkworm sutures. A drain is usually inserted through the ends of the wound and tulle gras dressings are applied, covered with gauze and cotton wool.

## AMPUTATIONS INVOLVING HAND AND FINGERS

*Nomenclature of fingers.* Nominal and numerical. Thumb (1st digit); index finger (2nd digit); middle finger (3rd digit); ring finger (4th digit); little finger (5th digit).

*Indications.* The retention of all parts likely to serve any useful function should be the guide to these operations. Conservative amputation is indicated in the presence of (1) congenital abnormalities interfering with function and not amenable to reconstructive surgery; (2) some benign or locally invasive tumours involving the metacarpus; (3) severe injuries and burns of digits and metacarpus and their consequences (degloving does not constitute an indication); and (4) gangrene resulting from local vascular obstruction or infection.

*Contraindications.* Where no digital tissue can be preserved and phalangisation is not practicable, formal below-elbow amputation is usually the treatment of choice rather than carpo-metacarpal because

no really functional prosthesis is at present available for this amputation site, although experiments are now being made to preserve active pronation and supination by retaining the carpo-metacarpal joints, and these stumps may become more useful than the traditional below elbow amputation especially in lighter occupations.

**Pre-operative Preparations**

*Anaesthesia.* General anaesthesia is to be preferred to brachial plexus block.

**Surgical procedure**

*Position of patient.* The slightly abducted arm should rest on a side table.

*Arrangement of towels.* As soon as possible after injury, the hand should be wrapped in a sterile towel. In the operating theatre the skin should be prepared with a non-injurious cleansing agent and all dirt and foreign material carefully and meticulously removed.

In the presence of gross contamination, definitive operation may have to be deferred and the surgeon must then confine his attention to debridement and excision of devitalised tissue. The incision should be planned

Fig. 2. This diagram shows the skin incisions used in metacarpo-phalangeal disarticulations.

to meet the particular case. The scar should, however, be on the dorsum and not on the palm or its borders. This necessitates providing ample palmar flaps.

In the thumb, conservation of tissue for subsequent reconstructive operation is particularly important and it is imperative to retain as long a stump as is possible and to disregard cosmetic appearance.

## METACARPO-PHALANGEAL DISARTICULATION

*The incision.* A " racquet " incision at the level of the palmo-digital fold with a dorsal " handle " is employed. In the middle and ring fingers the incision is symmetrical, but in the thumb, index and little fingers the portion of the flap at the border of the hand is larger (Fig. 2).

The tendons, vessels and nerves are divided and the joint capsule exposed.

*Surface markings for racquet incision.* The surface marking of joint space does not correspond to the knuckle but is more distal. In the metacarpo-phalangeal joint it is $\frac{1}{2}$ in. (1.25 cm.) distal and the incision should be modified accordingly.

In the proximal interphalangeal joint it is $\frac{1}{4}$ in. (0.7 cm.) and in the distal interphalangeal joint $\frac{1}{8}$ in. (0.3 cm.) distal to the knuckle. In the index finger the racquet should circle the base of the finger distal to the web.

The racquet for the middle and ring fingers should circle the base of the fingers about $\frac{1}{3}$ in. (1 cm.) distal to the web to ensure closure without tension.

The incision for the little finger should be level with the web to give a good appearance; the head of the 5th metacarpal should be bevelled. The handle of the racquet must be prolonged proximally to give the necessary exposure, and should lie dorsally.

The heads of the metacarpal of ring and middle fingers are seldom removed, but those of the index and little fingers are, except where strength is required rather than a neat appearance, as with heavy manual labourers. The cut ends of the tendons are never sutured.

The wide cleft between the index and ring fingers corresponds with the intact third metacarpal head. If the metacarpal head has been excised the gap is much less.

*Disarticulation.* Dorsal incision of the capsule permits disarticulation. The tendons are divided at joint level.

The tourniquet is now released to enable the assessment of viability of the tissues in hand injury, and to secure haemostasis. Skin suturing should be carried out without tension.

## AMPUTATION OF PHALANX AND METACARPAL BONE

This is so-called " ray " amputation and is occasionally useful in suitable and selected cases, such as new growths or chronic infections involving the metacarpal head.

*The incision.* The incision is similar to that employed in disarticulation at the metacarpo-phalangeal joint, but an elongated handle is placed directly over the metacarpal bone.

*Excision of a metacarpal.* The tissues are divided down to the bone and the operator excises the metacarpal bone, keeping close to the bone tissue to ensure the safety of the vessels and nerves of the palm. The divided transverse metacarpal ligament is sutured with catgut, the tourniquet is released and haemostasis is secured. The wound is closed with drainage. No attempt is made to restore the attachments of the interosseous muscles because serious inrolling of the remaining digits may result. They may be safely left to obtain spontaneous attachment (Fig. 3).

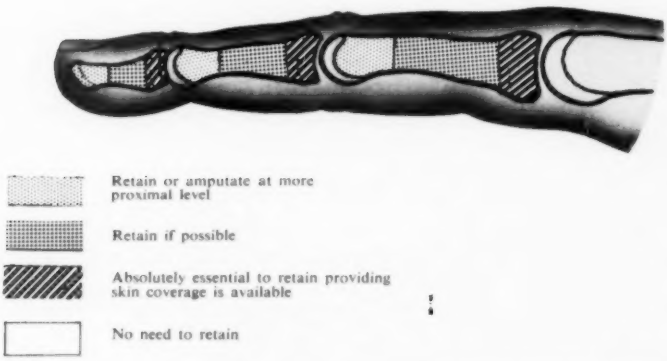
Retain or amputate at more proximal level
Retain if possible
Absolutely essential to retain providing skin coverage is available
No need to retain

Fig. 3. This diagram shows the relative importance of various sections in a finger in the case of an amputation.

## AMPUTATIONS FOR SEVERE INJURIES

Here each case must be judged on its merits. The important point is to conserve tissue, provided enough or useful function remains. No set plan can be followed.

*Amputation through interphalangeal joints* or of a phalanx of a finger. A larger palmar flap than a dorsal one is fashioned. Both flaps are made convex distally. The superficial tissues and the extensor tendon are

divided and the palmar flap is dissected up and the flexor tendon(s) divided at its base and allowed to retract. The bone is divided with fine forceps. Bleeding points are ligated with No. 000 fine catgut. The digital nerves are gently drawn down divided, and allowed to retract.

When disarticulation is performed the incisions are more proximal and the capsular ligaments are divided. The head of the remaining phalanx is denuded of cartilage and trimmed from the sides so as to assume conical shape. The flaps are drawn together over the sectioned bone or articular surfaces and sutured without tension using nylon sutures.

## LOWER EXTREMITY

The standard forms of amputation are as follows (Fig. 4) :

(1) Disarticulation at the hip and subtrochanteric, (2) Above-knee, (3) Disarticulation at the knee, (4) Below-knee, (5) The Syme's amputation, (6) Amputations which involve the foot, and (7) Amputations of toes at various levels.

It will be noted that whereas in the upper extremity disarticulation is usually a method of second choice, and is considered a bad one at that, in the lower extremity disarticulation at the hip, knee or ankle may often be an alternative of equal value to amputation through the femur or tibia.

## SUBTROCHANTERIC AMPUTATION AND DISARTICULATION AT THE HIP

In view of recent improved fitting methods and the experiments which are proceeding in the re-design of the tilting-table limb, views as to the retention of the head of the femur and the trochanter are undergoing change. It has been found that with a hip disarticulation, adequate control of the limb and a better and more comfortable sitting position can be obtained, and in any case for women and girls the disarticulation is preferable.

### Indications

*Injuries.* Injuries are an important indication and here an emergency amputation may be performed in such a way that every piece of viable tissue is preserved with a view to a planned " ideal " re-amputation.

*Tumours.* Malignant tumours of the thigh which do not require a hindquarter operation are usually best treated by a disarticulation through the hip joint.

Other indications for these amputations include gas gangrene, chronic infection, deformities, gross ulceration with contraction of the soft parts and, occasionally, benign tumours.

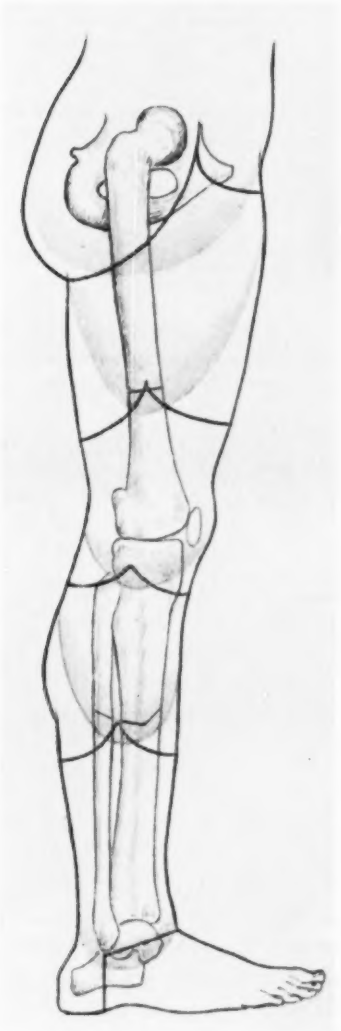

Fig. 4. This diagram shows the conventional amputation sites of the lower extremity, illustrating the lines of bone section, the initial and the ultimate shape of the stump.

**Surgical procedures—subtrochanteric**

*The incisions.* The scar of these amputations should be anterior, in the region of the inguinal ligament, where it is free from the pressure of the socket of the tilting table.

*Anterior incision.* This incision is the shorter of the two. It starts from a point at the level of and about 2 ins. (5 cm.) lateral to the anterior superior iliac spine, and is convex downwards, reaching its lowest point at a point about 2½ ins. (6.25 cm.) below the mid point of the inguinal ligament; it is then carried upwards, and medially to the region of the pubic tubercle.

*Posterior incision.* The posterior incision is much the longer of the two and is carried from the lateral extremity of the anterior incision in a downwards convex curve, reaching about 8 ins. (20 cm.) below the gluteal fold; it is then carried upwards and medially to the medial extremity of the anterior incision, and should include skin, subcutaneous fat and fascia down to the muscle.

*Anterior exposure.* The skin and subcutaneous tissues are reflected in one layer to expose the long saphenous vein, which is divided and traced proximal to its junction with the femoral vein. If block dissection of the inguinal lymph nodes is desired it can be carried out at this stage and the subcutaneous tissue, together with the lymph nodes, dissected downwards in a continuous layer and removed. A finger is passed along the femoral canal, the inguinal ligament is divided and its cut ends are reflected, exposing the external iliac artery from the bifurcation of the common iliac artery. The iliac lymph nodes can then be dissected as far as the bifurcation of the common artery and removed in one strip.

*Division of the femoral vessels.* The superficial branches of the femoral vein and artery are now divided between artery forceps and ligated; the medial and lateral femoral circumflex vessels are then similarly dealt with. The femoral artery and vein are cleaned and ligated below the inguinal ligament, using an aneurysm needle. The femoral canal is now palpated for the presence of Cloquet's inguinal lymph node, and this is removed. It is important to remember that the profunda femoris artery comes off about 1½ ins. (3.75 cm.) below the beginning of the femoral artery. It should be ligated and divided together with the circumflex femoral vessels, to avoid retrograde bleeding (Fig. 5).

*Division of the bone.* The muscles are divided down to bone, well above the level of the lesion both in the front and at the back of the thigh. All bleeding points must be secured either by ligatures or sutures. The posterior muscles are now divided and a large pack placed in the wound to control haemorrhage. A Gigli saw is used to divide the femur at a level below the lesser trochanter. This method of dividing the bone enables

the surgeon to get the correct slant for shaping the stump and is relatively non-traumatic. The handles of the Gigli saw should not be held too close to one another to prevent the saw becoming jammed in the cut (Fig. 5).

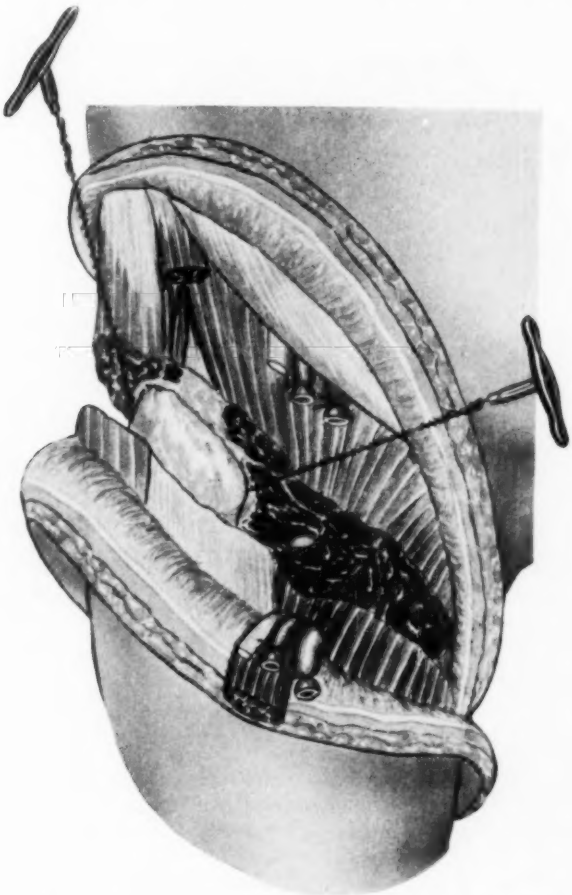

Fig. 5. Hip amputation—pertrochanteric—after ligaturing the femoral vessels, division of the muscles illustrating the line of section of the bone by a Gigli saw. (From *Operative Surgery*, edited by Charles Rob and Rodney Smith. London, Butterworth.)

*Removal of the limb.* After division of the femur the limb is removed. Haemostasis is now checked, and any further bleeding points are secured.

It will be seen that there is a large mass of muscle, posteriorly, which can be utilised to cover the bone. The sciatic nerve which has been divided can now be shortened and allowed to fall into the depth of the wound (Fig. 6).

Fig. 6. Hip amputation showing the approximation of the gluteal muscles to the muscles in front of the hip joint prior to closure of the wound. (From *Operative Surgery*, edited by Charles Rob and Rodney Smith. London, Butterworth.)

## DISARTICULATION OF THE HIP

Alternatively, if a disarticulation of the hip is desired, the capsule of the hip joint is incised in front and at the back. The head of the femur is now dislocated from the acetabulum, the ligamentum teres divided, the joint disarticulated, and the limb removed.

Where there has been chronic infection, or previous operations around the hip joint, the separation of the limb from the trunk may be laborious.

*Closure.* The long posterior flap of muscle is utilised to cover the cut surface of the bone or the exposed joint surface and is sutured to the anterior muscle by interrupted chromic catgut sutures. Wherever the condition for which amputation is carried out makes it possible, it is best to preserve the long posterior flap of muscle to be sutured to the anterior cut muscle, as this enables the short stump to retain some voluntary movement to initiate active movements in the tilting table. The skin incision is closed by interrupted silkworm or nylon sutures.

Drainage by a long corrugated drain is always employed and the drain is made to protrude both at the medial and lateral extremities of the incision.

## VERY SHORT FEMORAL STUMPS

When circumstances render a very high femoral shaft bone section necessary, leaving less than 2 ins. (5 cm.) of functional stump below the level of the ischial tuberosity, it has rarely been possible to fit the usual type of prosthesis supplied for the above-knee stump. Even in such cases, where a functionless stump is to be expected, it is best to amputate at the level of the lesser trochanter, retaining the head, neck and great trochanter, which provide a good anchorage for the socket of the tilting-table limb, although it would be too short to fit into and control an above-knee limb.

## ABOVE-KNEE AMPUTATIONS

When surgical conditions demand a bone section of the femur in adults of average height, it has been found in Britain that a stump of 10 to 12 ins. (25-30 cm.), measured from the top of the great trochanter, provides the most satisfactory stump in that there is freedom from circulatory defects as time goes on and power and leverage are adequate to control any artificial limb for above-knee amputation.

*In ischaemic gangrene.* The essential requirement is to obtain primary healing. In general, the presence of a palpable popliteal pulse means that a below-knee amputation will heal. For patients with an absent popliteal pulse an above-knee amputation is advisable. When in doubt the use of an oscillometer will determine the degree of pulsation above and below the knee joint.

### Incisions

*Skin incision.* This consists of a longer anterior than posterior flap cut to include the deep fascia. They are designed so as to produce a stump 11 ins. (28 cm.) in length, measured from the great trochanter.

*Division of soft tissues and femur.* The muscles are divided and later the agonist and antagonist groups are re-sutured over the end of the bone, then the bone is divided at the level to which the muscles have retracted. The end of the bone should be smoothed off with a file, and the periosteum not interfered with, as there is a predisposition to form periosteal spurs at this site.

*Haemostasis.* The sites where the main blood vessels, femoral artery and vein, profunda femoral vessels and great saphenous vein are to be found are explored and these vessels are ligated before removal of the tourniquet. The tourniquet is then removed and all additional bleeding points are attended to.

*Closure.* Occasionally in a thin patient, or where much atrophy has taken place, interrupted sutures may be required to approximate the

muscle over the end of the bone. A further layer of sutures is always placed through the deep fascia and the skin is now closed with interrupted silkworm sutures. A terminal scar will be produced (Fig. 7).

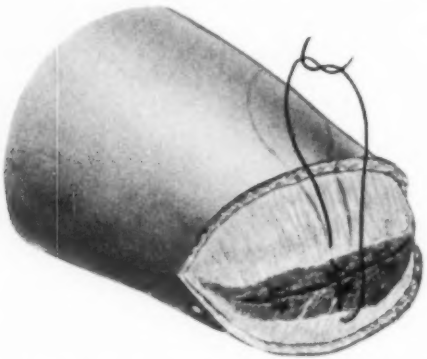

Fig. 7. Amputation through the thigh showing the approximation of the flexor and extensor muscles prior to suturing the deep fascia. (From *Operative Surgery*, edited by Charles Rob and Rodney Smith. London, Butterworth.)

*Revision of incision.* If " dog-ears " occur they should be removed. This is necessary in order that a well-shaped conical stump, free from puckered edges, will be produced.

*Drainage and dressing.* A through-and-through drain is inserted and a layer of tulle gras applied to the wound. A generous amount of dressing should be used and a firm crepe bandage applied.

## DISARTICULATION AT THE KNEE

When femoral bone section is not essential and when there is sufficient viable skin to provide adequate flaps, a disarticulation at the knee should be preferred to the so-called ideal 10 to 11 in. (25–27.5 cm.) stump. The advantages are speed of operation, no interference with the anastomosis around the knee, no section through muscle sheaths, and the provision of a natural end-bearing surface which gives a proprioceptive sense of balance and position (especially valuable in blind patients).

It is found that patients fitted with the limb for a knee disarticulation more rapidly acquire balance and their period of training in the use of the limb is less than it is with those who have undergone amputation through the femur.

The retention of the epiphysis at the lower end of the femur in children is obviously a great advantage.

*Indications.* This operation may be rapidly performed with minimal blood loss. It is, therefore, indicated in desperately ill patients, particularly those with multiple injuries including crushing of the legs and feet.

The operation is also indicated in those amputation cases where it is impossible to do an adequate below-knee amputation and yet there is sufficient skin available to perform a disarticulation of the knee and cover the condyles with healthy skin. The operation proves useful in elderly patients, but the prosthesis may be a heavy one particularly if a knee lock (ring-catch joint) is required and may be contraindicated for those of poor physique, for whom the above knee limb would be lighter, but the value of end bearing to those patients of poor physique far outweighs any slight excess in weight which is situated proximally and does not matter very much.

**Surgical procedure**

*Position of patient.* The first stage of the operation of disarticulation at the knee joint is best performed with the patient lying prone (Fig. 8).

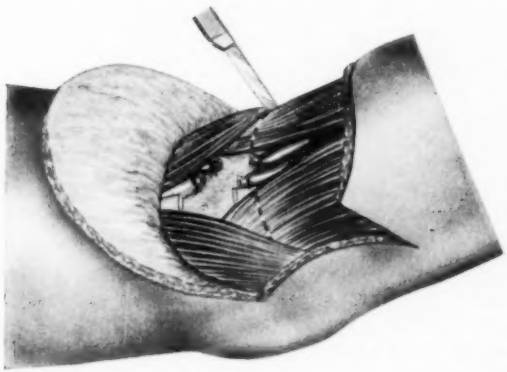

Fig. 8. Disarticulation of the knee from the posterior aspect showing ligation and division of the popliteal vessels and the line of section of the popliteal structures before entering the knee joint from the back. (From *Operative Surgery*, edited by Charles Rob and Rodney Smith. London, Butterworth.)

*Incision and skin flaps.* The line of the skin incisions will produce a long anterior and a short posterior flap. The aim is to have a posterior scar, the skin in the front of the knee-joint being used to form the weight-bearing area. In cutting the skin flaps, a generous amount of skin should be allowed. A semilunar incision, starting at the level of the joint laterally, is carried downwards for about 2 ins. (5 cm.) below the popliteal

fold. The flap includes skin and superficial fascia. The anterior incision should pass at least a hand's breadth below the lower pole of the patella, and below the tibial tubercle.

*Ligation of major vessels.* The popliteal fossa is now entered and, before division, the popliteal artery and veins are doubly ligated below the origin of the superior genicular branches. The popliteal nerves are divided.

*Division of soft tissues.* The muscles bounding the popliteal fossa, the oblique popliteal ligament and the capsule are then divided.

The patient is then turned on his back.

*Disarticulation.* The anterior flap is now raised until the ligamentum patellae is exposed, this is divided and the knee joint is entered.

The knee is then flexed and the scalpel inserted between the femur and the semilunar cartilages, dividing the anterior parts of the capsule and synovium. Further flexion enables the surgeon to divide the cruciate ligaments and the remaining portions of the capsule along with the collateral ligaments and the popliteus tendon. The limb is now removed.

*Excision of patella.* The anterior flap is turned upwards and the patella carefully enucleated, the surrounding fatty tissues being preserved and approximated by catgut sutures. The fascia of the posterior flap is approximated by a few catgut sutures to the infrapatellar tissues.

*Closure and drainage.* The wound is closed in layers with tension sutures. The suture line should be behind the femoral condyles. At the end of the operation there should be a good pad of tissue over the lower end of the femur. Drainage should be provided with a corrugated rubber drain, as these amputations are prone to form a haematoma.

## BELOW-KNEE AMPUTATION

*Length of stump.* The ideal length of stump remains at 5½ ins. (14 cm.) (measured from tibial plateau) for adults of average height. Patients with amputations at this site continue to lead active lives after 40 years of limb wearing provided the artificial limb is fitted so that the weight is distributed between the thigh and the distal aspects of the upper end of the tibia. Stumps of this length, however, which have been fitted so that the whole of the weight is borne upon the tibial weight bearing surface have, with some exceptions, shown intolerance to limb wearing after 10 to 15 years, while longer stumps, however fitted, have often developed circulatory troubles.

### Surgical procedure

Total excision of the fibula head is advocated only in very short stumps, in which the fibula would tend to abduct. Its retention, when possible, provides a good anchorage for the socket and acts as a shock absorber

when wearing a limb. The shortest tibial stump which has been satisfactorily fitted with a below-knee limb, with good function, is $1\frac{3}{8}$ ins. (3.5 cm.) in an adult.

*The incisions.* The incision produces anterior and posterior flaps. The anterior flap is slightly longer than the posterior. The flaps should be cut long enough to give a stump of $5\frac{1}{2}$ ins. (14 cm.) of length of tibia when measured from the knee-joint line.

*Stripping of deep tissues.* The flaps should include skin and subcutaneous tissue and deep fascia, which are raised as a continuous layer to the level of the apex of the incisions. The deep fascia is cut as a continuous layer to include the periosteum of the tibia as it merges with it. The periosteum is stripped with a rugine and the combined layer of periosteum and deep fascia is raised off the tibia to the point where it is proposed that the bone shall be divided.

*Division of tibia—oblique cut.* The muscles are divided with a scalpel and allowed to retract. They usually leave a gap of about 1 in. (2.5 cm.). When they have retracted to their limit, an oblique saw cut is made beginning about an inch proximal to the level of the cut muscle, and ending at the level of the cut surface of the muscle. The angle of the bevel should be about 45 degrees.

*Division of tibia—transverse cut.* The tibia is completely sawn across transversely at the selected site, at right angles to the long axis of the bone.

The muscles have retracted and a shield is not essential. When the surgeon is dividing the bones the assistant retracts the skin and fascia with retractors in order to protect the adjacent tissues.

It is preferable to divide the tibia before attending to the fibula.

*Division of the fibula.* A Gigli saw is then introduced between the cut ends of the tibia from the medial side and placed about 1 in. (2.5 cm.) proximal to the cut end of the tibia on the fibula which has previously been cleared from the surrounding muscle. As this is done from the medial to the lateral side, it produces a clean oblique cut of the fibula which is in conformity with the desirable convex shape of the stump. The Gigli saw enables the fibula to be divided without splintering and at an appreciably higher level than the tibia (Fig. 9).

*Smoothing of cut surface of the bone.* The tibia and fibula having been divided, the cut edges of the tibia are now smoothed and all corners removed with a file. This is essential as the bone is to lie subcutaneously. The file employed is a flat one specially designed with a handle at one end and a knob at the other so that the operator has accurate control.

*Ligation of blood vessels.* In the anterior compartment, ligation of the anterior tibial artery is necessary; in addition, there is another small artery—a branch of the anterior tibial or a branch of the peroneal artery

which lies close to the anterior tibial artery. In the posterior compartment of the fibula, and close to this bone, the peroneal artery requires ligation, while on the medial side the posterior tibial artery is ligated. The anterior and posterior tibial nerves are gently pulled down and divided

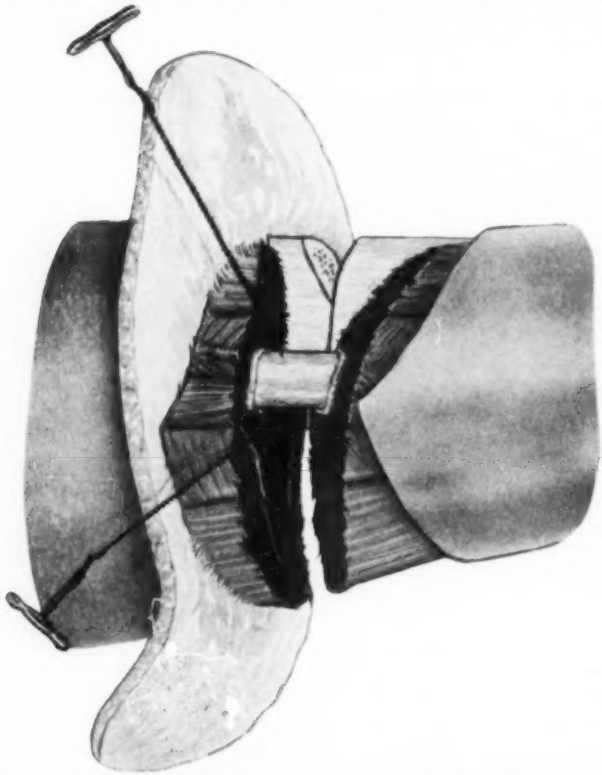

Fig. 9. Below knee amputation showing the skin flaps, the lines of muscle section, the method of division of the tibia and the fibula with a Gigli saw. (From *Operative Surgery*, edited by Charles Rob and Rodney Smith. London, Butterworth.)

as high as possible, without excessive traction. Catgut is always used for ligation of blood vessels and where the vessel walls are friable the catgut should be transfixed to the neighbouring tissues on a needle.

*Haemostasis.* The tourniquet is now removed and final haemostasis is secured by ligature and if necessary by catgut sutures applied through the muscle where bleeding persists. Haemostasis should be meticulous.

Before beginning to close the wound, a dry gauze pack is applied with pressure over the cut surface of the muscle to aid haemostasis, and this

should be kept in position for three minutes. It will then be found that the small vessels have clotted and the wound is dry. Closure of the wound should not begin until this has been achieved.

*Closure.* The deep fascia is sutured with interrupted catgut and the skin is sutured with interrupted silkworm gut. A drain is usually necessary; this should be of corrugated rubber and be allowed to protrude from the ends of the wound. Vaseline gauze dressings are first applied, followed by gauze and cotton wool. The stump is bandaged and applied to a back splint which should extend from the upper thigh to below the stump, and be left on for 48 hours to prevent flexion and to keep the limb steady.

## DISARTICULATION OF THE ANKLE (SYME'S AMPUTATION)

*Indications.* This amputation is indicated in injuries of the forefoot which leave the heel-flap skin intact. It may also be used for chronic diseases of the foot and toes. The operation obtained a bad reputation in England after World War I, when many Syme's amputation stumps broke down. In Scotland and in Canada, however, it never fell into disrepute. There is some evidence that the poor results in World War I were owing to the use of this operation in patients with trench feet, when the heel flaps were involved by vascular abnormality, or attempts to modify Syme's original technique.

*Contraindications.* This operation should not be used in patients with peripheral vascular disease. When the ankle pulses are present a transmetatarsal amputation is preferable and when they are absent a Syme's amputation seldom, if ever, heals satisfactorily.

### Surgical procedure

*The incisions.* A point 1 in. (2.5 cm.) below and in front of the tip of the internal malleolus is marked and another point opposite, on the side of the external malleolus. With the foot held at 90 degrees these two points are joined by an incision straight across the plantar surface of the foot, cutting everywhere cleanly to the bone. The two points are joined again by another straight incision across the dorsum of the foot at the level of the ankle joint cutting to the bone. Some modification may be required for deformity of the foot—for example, equino varus, equinus, or previous injury or operation.

*Disarticulation of ankle joint.* Forcible plantar-flexion of the foot and cutting of capsule and ligaments dislocate the talus downwards. When this is complete the tendo Achillis should be visible from the anterior aspect.

*Conservation of periosteum.* On the outer side the periosteum on the calcaneum is cut through and with a periosteal elevator or osteotome a subperiosteal dissection is performed, clearing the calcaneum.

Similarly, a subperiosteal dissection is done on the inner side, taking great care to avoid injury to the adjacent neurovascular bundle. This dissection is greatly aided by alternately adducting and abducting the plantar flexed foot. It is important to keep to the bone as close as possible while stripping off the soft tissues from the calcaneum (Fig. 10).

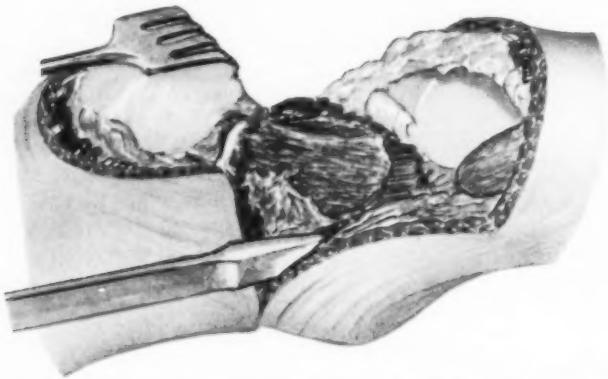

Fig. 10. Syme's amputation showing enucleation of the os calcis from the heel by sub-periosteal dissection. *Note* the talus and the empty mortice of the ankle joint. (From *Operative Surgery*, edited by Charles Rob and Rodney Smith. London, Butterworth.)

*Division of tendo Achillis and excision of calcaneum.* The tendo Achillis is then cut at its insertion. Maintaining strong plantar flexion the calcaneum is shelled out of the thick heel flap. At this stage, tearing of the thin skin at the junction of the original incisions is likely to occur and should be avoided.

*Haemostasis.* The bed of the calcaneum is packed with gauze, the tourniquet is released, all bleeding vessels are ligated. The posterior tibial nerve is dissected out and divided as high as possible; if it is intimately bound to the artery, making arterial injury probable, it should be left alone. Should a painful neuroma develop subsequently, the nerve can be divided through an incision at a level above the stump.

*Removal of malleoli.* The soft tissues about the malleoli and lower end of the tibia are retracted. The malleoli and a thin slice of bone from the tibia are removed with a sharp saw applied at right angles to the long axis of the leg to ensure that weight is borne squarely on the end of the stump.

The sharp edges of the sawn tibia are rounded off with a file, the tendons pulled down and cut at a level above the amputation.

The gauze packing is removed and the flap fitted. Usually there is bulging of the soft tissues laterally and, to a lesser extent, posteriorly. This redundance of soft tissue is more marked the higher the level of the sawcut in the tibia.

*Closure and drainage.* Two No. 2 chromic catgut sutures, one on either side, are used to approximate the posterior margin of the periosteal bed to the periosteum on the posterior margin of the tibia.

Again the flap is fitted in the desired position. While this is held, two silkworm gut sutures are placed, each taking a deep bite into the soft tissue over the anterior aspect of the leg and in the heel flap. These are not tied but left as indicators of the desired position. A small corrugated drain is inserted to project from either side. The anterior periosteal bed is fixed to the anterior margin of the tibia with one medial and one lateral No. 2 chromic catgut suture. The subcutaneous tissues are united with a suture No. 1 catgut, and the skin sutured with meticulous care. There will be redundant soft tissue "ears" projecting medially and laterally which should not be trimmed. A 2-in. strip of porous adhesive plaster is applied over a small dressing, passing from the posterior aspect of the leg over the end of the stump, ending well up on the anterior aspect; this helps to hold the flap in the desired position. A second adhesive strip is passed from side to side. Copious gauze dressing and pads are applied and bandaged firmly.

*Errors in technique.* The following are some of the more common technical errors :

(1) The endeavour to produce an immediate neat appearance by trimming the flaps, thus injuring the blood supply.

(2) Failure to maintain the position of the heel flap until firmly fixed.

(3) Curving the heel incision backward and the dorsal incision upward. When sutured, this draws the heel flap anteriorly bringing the thin skin on the back of the heel to the inferior position.

(4) Too high division of the tibia. This gives a poorer bearing surface and makes the heel pad more easily movable. Although higher division of the tibia makes limb fitting easier, the vascularity poorer; the ultimate result is worse. In some cases where low division is done, a lift may be required on the opposite side. The greater comfort from the large bearing surface more than compensates for this inconvenience.

(5) Insistence on dissecting out the posterior tibial nerve when it is intimately bound to the artery.

(6) Trimming away of the tissue in the heel flap. A clean cut with a sharp knife will obviate tags as does sub-periosteal dissection.

(7) Failure to produce meticulous haemostasis and drainage.

(8) Careless skin suture. The thick, cornified skin of the heel flap must have its deeper vital portion opposite the thin skin of the dorsal wound edge.

*Post-operative care and complications.* The original dressing is changed in 48 hours, unless removed sooner because of complaint of tightness. The dressing and strapping are renewed. The drain is completely removed, if drainage has been effective, usually in 4 days. The dressing is personally renewed by the surgeon every 48 hours for 2 weeks, and then at intervals until 4-6 weeks when the heel pad is well fixed.

All such patients can eventually walk on their bare stumps.

## AMPUTATIONS INVOLVING THE FOOT

### Transmetatarsal amputation

#### Indications for surgery

Amputations through the forefoot may be indicated for the following reasons: severe crushing involving all the toes; some cases of frost bite limited to the toes; some cases of peripheral arteriosclerosis and diabetic gangrene, where amputation should be radical, but conservative done at the lowest level where healing is assured. There is only one operation that should be employed: transmetatarsal. This operation is satisfactory and heals to give an excellent stump suitable for full weight-bearing, and can be easily fitted with a boot or shoe. A slight limp in walking is unavoidable because the normal rocker movement of the foot is lost. If the amputation results in a scar, or residual tenderness on the plantar or distal aspect of the stump, it is most difficult to fit a comfortable prosthesis or blocked shoe.

The choice of amputation to employ depends on the individual case. In non-diabetics the more proximal vessels are usually affected whereas the specific vascular disease of diabetics affects the distal vessels although arteriosclerosis may be present. The amount of plantar skin present or the extent of the gangrene and the existing circulation dictate the level, and a very careful assessment of the circulation is therefore essential. Success is more likely in the operation for trauma than in the peripheral type of arteriosclerosis.

Where a block exists in the popliteal or femoral arteries, healing is most unlikely to take place unless the collateral circulation is very good. The general health of the patient must be fully investigated and such conditions as diabetes mellitus and anaemia treated.

The transmetatarsal operation may be undertaken if there is a reasonable chance of success for, if failure occurs, an amputation at a higher level can always be performed.

#### Surgical procedure

*The incisions.* The dorsal incision begins at the mid-point of the inner

aspect of the foot, passes convexly across the dorsum and immediately beyond the anticipated level of bone section to a similar point on the outer aspect of the foot.

The plantar incision joins the two points of the dorsal incision in a line convex distally and extending to the level of the metatarsal heads.

*The flaps.* The aim is to obtain a long plantar flap and a short dorsal flap because the plantar is thicker and better nourished, and to avoid a scar on plantar or distal aspect of stump. The plantar flap has to be longer on the medial side because the stump is thicker on this side than on the lateral side. This flap should always extend well beyond the cut surfaces of the bones because dorsal skin is not suitable for weight bearing.

*Division of soft tissues.* The plantar incision is carried down to bone and a short flap is raised back to the level of bone section. The dorsal incision is made down to bone, but there is no attempt to raise a flap.

*Bone sections.* The metatarsal bones are divided at a level suitable for closure of the flaps. The section is made parallel to the tarsometatarsal joints, but the 5th metatarsal bone is shortened and the outer side bevelled with a file.

*Cutting of extensor and flexor tendons.* The extensor and flexor tendons are pulled down and cut short.

*Closure.* Any bleeding points are ligated. The deep fascia is sutured with interrupted catgut and the skin closed with nylon. No drainage need be used.

Back splints for a below knee amputation and the avoidance of a pillow in the popliteal fossa are essential, while the post-operative care of a partial foot amputation is important, particularly for the avoidance of an equinus deformity, by employing a right-angled plaster back-splint.

## AMPUTATIONS OF TOES AT VARIOUS LEVELS

### Indications for surgery

Preservation of digits is not so important as in the hand, but the great toe should if possible be preserved. Nevertheless there is no object in retaining the great toe if all the others, or even three of the others, must be removed. Indeed, unless three toes can be retained on a foot it is better to remove them all. A comfortable surgical boot or shoes cannot be made to suit a foot with only two toes, but by means of inserts a patient with three or more toes, or with no toes at all, can be made comfortable in surgical footwear.

Trauma and gangrene are the main indications, although amputation is occasionally undertaken for ingrowing toenails or onychogryphosis, or even benign growth. It is unwise to amputate intervening toes for

deformities, because the remaining toes are pushed together into the gap and themselves become deformed. A toe, however, which has been pushed out of its place for years, usually the second, may require amputation.

Gangrene in toes is common and important, and careful consideration must be given to decide whether local removal will suffice or whether higher amputation is necessary. No decision should be taken without a knowledge of the peripheral circulation and the state of the collateral circulation. Sympathectomy may limit the extent of amputation. Gentleness in handling and meticulous care on suturing are necessary to avoid further necrosis. In diabetes, distal angiopathy of small digital vessels with subsequent proliferative endarteritis of the larger proximal vessels occurs although all these vessels are far from immune from ordinary arteriosclerosis.

## AMPUTATION OF GANGRENOUS TOES

In gangrene the amputation should be performed well proximal to the gangrenous area and by a circular and not a racquet incision, because of probable damage to digital vessels. The cartilage of the head of the proximal bone can also be removed with nibblers. Gentle handling of the soft tissues is essential to prevent further necrosis. The cuff of skin is loosely closed with interrupted sutures. *Tension must be avoided.*

### Surgical procedure

#### Partial amputation or disarticulation of distal phalanx of the great toe

*Incision.* The incision is made down to bone from a point on the lateral aspect about ½ in. (1.25 cm.) distal to the interphalangeal joint, to a corresponding point on the opposite side; this marks out a single plantar flap.

*Plantar flap.* The toe is dorsiflexed and the plantar flap is dissected away from the phalanx. The phalanx is then divided at the required level or a disarticulation is carried out. If the phalanx is divided care must be taken to make certain that the section is made proximal to the nail bed, because if the nail matrix is included a nail will grow into the scar, cause pain or irritation, and will then require re-amputation.

*Suture of dorsal incision.* Before this is done all bleeding is arrested and then the vessels are tied with catgut. The plantar flap is then sutured to the dorsal flap with interrupted everting skin sutures. No deep sutures are necessary and no drainage required.

#### Amputation of proximal and distal phalanges of the great toe

The whole or part of a toe may be removed through semilunar incisions, the posterior incision being longer than the anterior making the posterior flap longer than the anterior.

If this incision is not possible because of skin destruction, adjacent skin may be mobilised by judicious fashioning, or even filleting the toe so as to cover the head of the first metatarsal.

*Incision.* With the toe plantar-flexed and separated from its neighbour by a gauze swab held by an assistant, the incision is begun at the level of the metatarso-phalangeal joint, carried down the toe towards the neck of the first phalanx, and then curved medially round its medial border. The incision is continued obliquely to the web between the first and second toes. This is best accomplished by dorsiflexing the toe and plantar-flexing it again, so that the incision can be carried from the web to the point from which it started.

The incision should be carried down to the bone to avoid damaging the blood supply of the flap. The toe is dorsiflexed and the joint opened by dividing the capsular ligament distal to the sesamoid bones which are left *in situ.*

*Flap sutured over metatarsal.* After the bleeding points have been ligated, the flap is sutured without drainage.

**Amputations of Small Toes**

*The incision.* Semilunar incisions are best employed, the posterior flap being longer than the anterior. An assistant retracts the adjacent toes with a gauze swab on either side. The blade of the racquet encircles the toes at the level of the web. In the little toe the handle of the racquet is placed so that the scar is out of the way of pressure from the boot. The incision is carried down to bone and the disarticulation is performed by either dorsiflexing or plantarflexing the toe.

*Division of capsular ligament.* The capsular ligament is divided near the base of the first phalanx, preserving the transverse metatarsal ligament. The digital vessels are then ligated with fine catgut.

*Suturing of the wound.* Skin edges are sutured with fine eversion skin sutures.

## AMPUTATIONS FOR REMOVAL OF CONGENITALLY MALFORMED EXTREMITIES

In dealing with young persons the principle of conservatism should apply and amputation be withheld, always provided that, in lower extremity cases, the child can be rendered ambulant by some form of extension prosthesis. Repeated manipulations and serial plasters over many months will improve deformities which at first sight seemed hopeless.

If the latter proviso holds good then it is better to defer amputation until such time as the child attains the age at which he can decide for

himself. In a number of cases, particularly girls, amputation has been asked for during adolescence when they can appreciate the implications.

Conservative procedure such as tenotomies, excision of abnormal and deformed joints, osteotomies and division of contractures, often result in a useful and serviceable, albeit short, limb which can be fitted with an extension prosthesis until such time as a definitive amputation may become necessary.

## AMPUTATIONS FOR TRAUMA OR DISEASE IN CHILDREN

Unlike the policy adopted toward adults, it cannot be said that there are any ideal sites or stump lengths where bone section is necessary.

When circumstances permit, in children it is especially useful to perform a disarticulation at the knee thus conserving the lower femoral epiphysis, or a Syme's amputation, thus conserving the lower tibial and fibular epiphysis to forestall the formation of a "conical" stump. But the chief advantage is that there is growth from both ends of the bone, and so a longer stump eventually results. When adolescence is reached, the Syme's amputation enables the patient to be fitted with a standard below-knee prosthesis, if the stump has not developed *pari passu* with the sound leg, without the necessity of further surgery.

Whenever bone section is contemplated the guiding principle should be to amputate at the lowest possible level using the techniques already indicated but with more generous skin flaps to avoid stretching as the bone grows. When the amputation is below the knee it is advisable to cut the fibula even shorter than when dealing with adults because of the more rapid growth of this bone.

For amputations of the upper extremity, while the same general principles already given for adults apply, the lowest possible bone section should be aimed at. For amputations above the elbow, more generous flaps are advisable because of the rapid growth of the humerus which in due course tends to pierce the skin and necessitates re-amputation, producing the so-called "conical stump of children".

## ACKNOWLEDGMENTS

I am indebted to my colleagues at the Limb Fitting Centre for their unstinting and helpful suggestions in the compiling of this article, and also to Dr. T. Ritchie, Principal Medical Officer, for his courtesy in supplying the above figures.

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# A NAPOLEONIC RELIC

by

**L. W. Proger, M.A., M.R.C.S., L.R.C.P.**

**Curator of the Pathological Museum**

NAPOLEONIC RELICS have always aroused wide interest and two preparations which were destroyed in the Museum of the Royal College of Surgeons of England during an air-raid in May 1941 have been no exception. Recent enquiries have prompted a re-examination of the history of these two specimens, since it appears that even the few known facts have become distorted by the passage of time and repeated misquotation in the literature.

The preparations were acquired in 1841, when the Council of the College purchased Sir Astley Cooper's collection of some 2,000 anatomical and pathological specimens. During the following years selections from this collection were added to the Museum, but it was not until 1883 that the two specimens in question were incorporated and described in the second edition of the catalogue prepared by Sir James Paget as follows :

" 2526. A portion of small intestine with a raised, rounded plaque of cancer projecting about one-eighth of an inch above the mucous membrane, and five-eighths of an inch in diameter; its surface is broken and fissured, and its edges overlap the mucous membrane around the base of attachment.

" 2527. Another portion of small intestine, with a much smaller oval cancerous nodule having a smooth rounded surface.

" This and the preceding were in the Museum of Sir Astley Cooper. The following entry is in the MS. Catalogue of Sir Astley Cooper's Museum:

" Incipient Fungus in the Glands of an Intestine. Napoleon.

" Barry O'Meara to Sir Astley Cooper.

**" Footnote by Sir James Paget**

" The truth of the statement that these portions of intestine were taken from the body of the Emperor Napoleon I is open to grave doubt. Dr. Antommarchi, Napoleon's personal physician, states, in his very complete account of the post-mortem examination, that ' the mucous membrane of this canal (intestinal) appeared to be in a sound state '; and in the separate report, drawn up by the English surgeons present at the autopsy, the statement is found that, with the exception of the stomach, ' the abdominal viscera were in a healthy condition '. It further appears from Dr. Barry O'Meara's memoir (*Napoleon in Exile*, etc.) that he was recalled to England nearly three years before Napoleon's death; and the steps taken by Napoleon's personal attendants to prevent the abstraction of the heart and stomach also show the improbability of these specimens having had the source ascribed to them. October 1883."

Although Sir James gave reasons for doubting the origin of the specimens he accepted Sir Astley's opinion that the nodules were cancerous and described them accordingly. With revision of the catalogue by Professor S. G. Shattock in 1909, the specimens were transferred to the Historical Series and their descriptions were included in the Illustrated Guide to that Series compiled by C. J. S. Thompson (Fig. 1).

Here the matter rested until 1913, when Shattock prepared histological sections of the lesions and demonstrated that they were inflamed lymphoid follicles and not cancerous. This removed one of the main objections to the authenticity of the specimens and further interest was aroused.

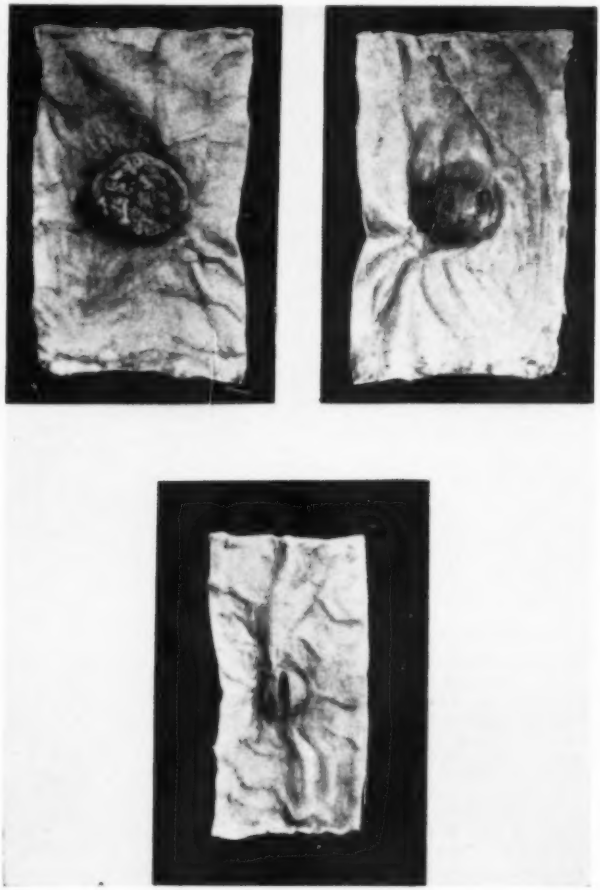


Fig. 1. The two specimens as shown in the *Illustrated Guide to the Historical Series.*

Sir Arthur Keith made Shattock's discovery the subject of a lecture to the Hunterian Society in the same year (Keith, 1913a), and in a masterly

review of the events and personalities associated with Napoleon's death, he concluded that the specimens were genuine. Inflammatory lesions such as these had been described by Antommarchi in his private report on the post-mortem findings, but these details were not mentioned in the official report. No doubt the latter was more in the nature of a political document designed to show that death was due to cancer of the stomach and unrelated to the conditions and climate of St. Helena, about which the Emperor had complained so bitterly. Widespread interest was shown in Keith's lecture but his conclusions failed to gain general acceptance owing to the mass of conflicting evidence, and the authenticity of the specimens still remained in doubt (Keith, 1913b).

All this speculation derives from an entry in Section Q of Sir Astley Cooper's museum catalogue, and re-examination of the original document has revealed further points of interest. The catalogue consists of two manuscript notebooks each containing a numbered list of the preparations, subdivided into lettered sections. One of the books appears to be a " fair " copy—probably for the use of visitors to the museum (Fig. 2).

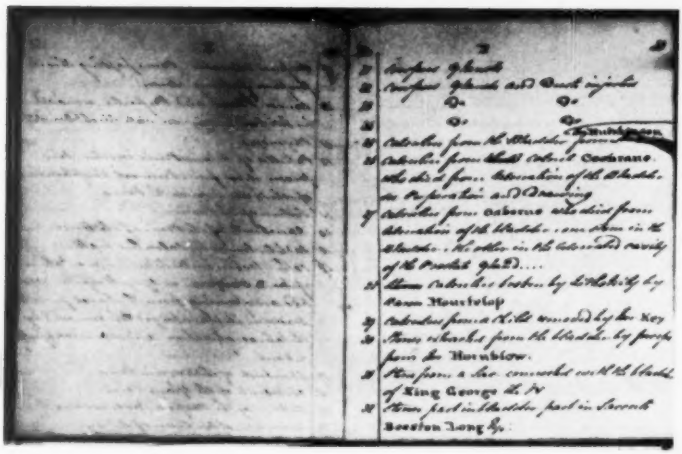


Fig. 2. The " fair copy " catalogue opened at Section F, showing the names of personages in Gothic script.

The other, of home-made, loose-leaf construction, appears to be a " work-room " copy in which notes and instructions are entered on the left-hand pages facing the descriptions on the right (Fig. 3). The names of patients, especially those of important personages, are entered in distinctive, Gothic style lettering after the description of the specimen, and these

names, with one significant exception, are similarly entered in the fair copy catalogue (Fig. 4).

Examination of the two books shows a number of features peculiar to the entry Q.25. In the loose-leaf " work-room " copy the note

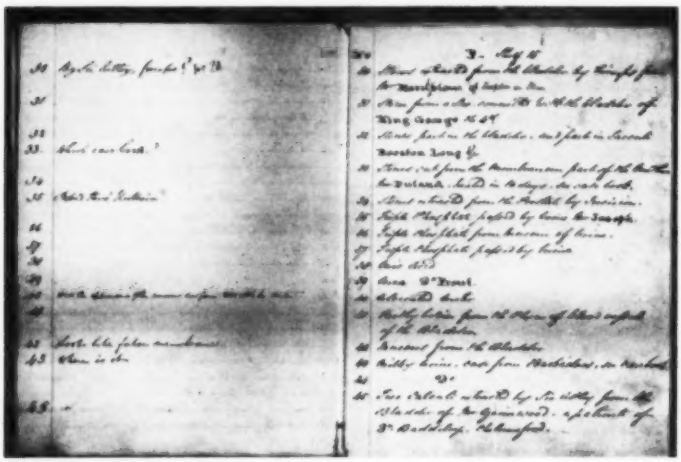


Fig. 3. The " work-room " catalogue, also opened at Section F; notes and instructions are seen on the facing page.

" Barry O'Meara to Sir Astley " is entered on the left-hand page (Fig. 5a). Following the description of the specimen on the right-hand page, the name " Napoleon " has been added, first in pencil and subsequently in ink by an inexpert hand (Fig. 5b). The name " Napoleon " has not been entered in the fair copy catalogue, and in the absence of the O'Meara note there is nothing in this book to indicate any association with the Emperor.

There is also no evidence that the next specimen (a similar condition) is from the same case, as was assumed by Sir James Paget. On the contrary, specimen Q.25 is bracketed with the previous one :

" Q.24. Fungus disease in a state of metastasis at the appendix vermiformis " (Fig. 5c).

It seems clear, therefore, that at least one of the specimens has no Napoleonic connections. As to the other, Barry O'Meara is known to have kept Napoleonic relics. Some, including a molar tooth and dental forceps, were sold after his death. It is also recorded that he gave a case of the Emperor's dental instruments to the father of Inspector-General Paynter (Keith, 1913c), who later presented them to the Museum of the Royal Army Medical College. In spite of the precautions taken by

officials, Antommarchi had the opportunity to obtain a small portion of intestine at the autopsy, and he could have passed it on to his friend O'Meara when they subsequently met in London.

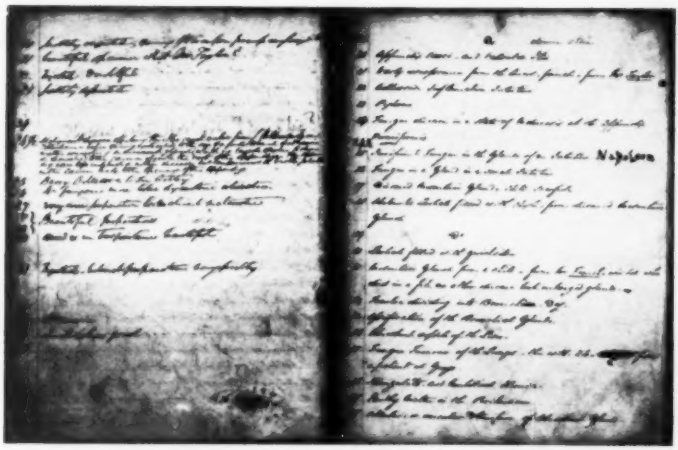
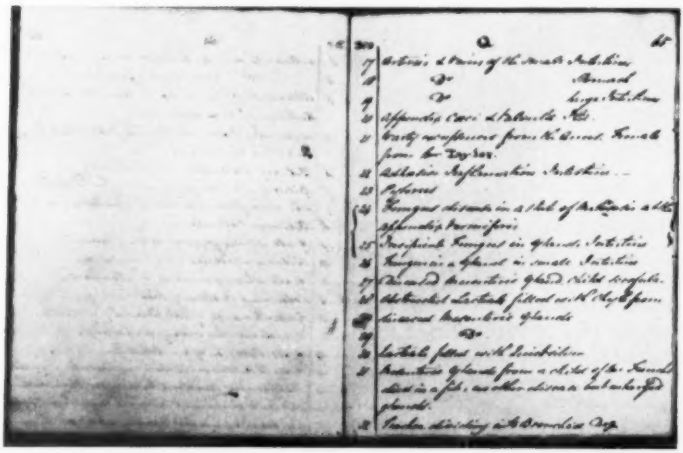


Fig. 4. The " Napoleon " entry in the " work-room " catalogue (top) and in the " fair copy " catalogue (below).



Sir Astley Cooper recorded in the " work-room " catalogue that the specimen was received from Barry O'Meara but the name " Napoleon "

was not boldly inscribed in both volumes as in the case of other distinguished personages. There is no reference to such an important relic in his writings but it may not have been politic at the time for Sir Astley

Fig. 5. Enlarged details of the entries in Section Q, No. 25:
(a) The O'Meara entry in the " work-room " catalogue on the facing page.
(b) The " Napoleon " entry in the " work-room " catalogue.
(c) The " fair copy " catalogue omitting the name " Napoleon ".

to have made a written record and the connection may have been referred to only in conversation. On the other hand, Sir Astley himself may have doubted the authenticity of a specimen from such an unreliable source, and deliberately omitted the name.

How the name of Napoleon came to be entered in the " work-room " catalogue remains uncertain. Perhaps some assistant, hearing the rumour or noticing the association with O'Meara, entered the name tentatively in pencil. Later, when the name was inked over, rumour became established fact.

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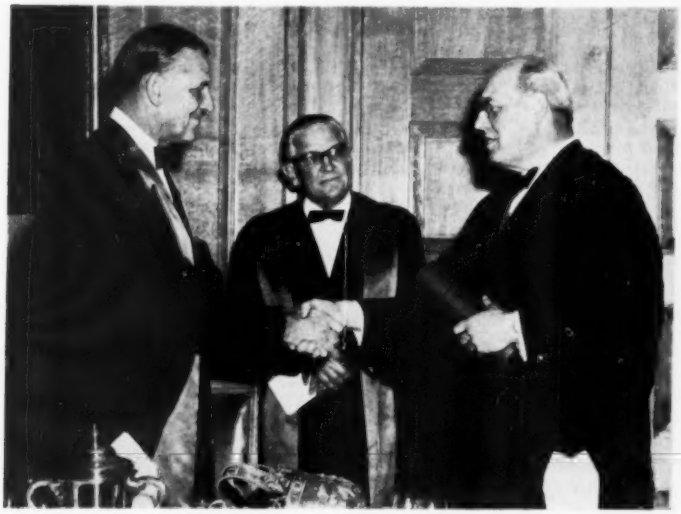
## ADMISSION OF LORD KINDERSLEY TO THE HONORARY FELLOWSHIP

THE RT. HON. LORD KINDERSLEY, C.B.E., M.C., Chairman of the College Appeal Committee, who had been elected an Honorary Fellow in June, was formally admitted on 12th November 1959 at a meeting specially arranged in his honour. In addition to the President and members of the Council with their ladies, there were also present Lady Kindersley, Gladys Lady Kindersley, the Hon. Robert and Mrs. Kindersley and Colonel and the Hon. Mrs. Napier Crookenden.



The President admitting Lord Kindersley to the Honorary Fellowship.
Sir Archibald McIndoe is in the centre of the picture.

The citation was delivered by Sir Archibald McIndoe, C.B.E., who spoke as follows :

" Mr. President, Members of Council, Ladies and Gentlemen:

" It is only on very special occasions that Council meets in this way. Tonight is such an occasion. The award of an Honorary Fellowship in the Royal College of Surgeons is the highest honour which can be conferred either upon a layman or a professional colleague and, as you well know, it is thus a rare distinction.

" In addition to members of the Royal Family only six laymen today hold our Honorary Fellowship. Tonight we shall create the seventh. All have been awarded for outstanding services rendered to the College and in this way we commemorate our gratitude to those who have helped us. It was the unanimous decision of Council that this honour should be conferred upon Lord Kindersley.

" He is so well known to all of you that I will not detain you with a mere recital of his achievements outside the College, except to say that any man who could at one time be Chairman of Lazard Brothers, a Director of the Bank of England and many other Banks, Governor of the Royal Exchange and Chairman of Rolls Royce must in city parlance be regarded as a Captain of Industry and a Prince of Finance. He is almost unique in his field and his position in the City proves that a great father can be succeeded by a great son.

" It is, however, his interest in medicine which concerns us here tonight. It began early. He served in the Scots Guards in two World Wars, was severely injured in both, and was decorated on the field. In both wars he was obliged to receive surgical attention and so he has personal knowledge of our faults and virtues.

" Then he married the daughter of a doctor. I know that no doctor's daughter ever escapes the influence of medicine or fails to communicate it to those around her. We are delighted that she will now have in her family a properly qualified exponent of the knife, though I suggest she should always take a second opinion.

" The weightiest medical influence must, however, have come from his Father and Mother. Together they founded and built the Queen Victoria Hospital at East Grinstead. His father, the late Lord Kindersley, was its President for over forty years, and its President today is the Dowager Lady Kindersley, who is with us tonight—a great lady, at 86 a most remarkable example of dedication to public service anywhere in this country.

" Here is the pattern then of a great family tradition from which it would indeed be difficult to escape. When Lord Kindersley was invited to head our Appeal, common sense and the sheer weight of his public duties made him hesitate, but fortunately for us his doubt was shortlived and I know we have to thank two ladies who must have influenced him heavily in our direction. What Lord Kindersley has done for this College since he accepted this onerous task is tremendous. He set about it with imagination and enthusiasm, but always quietly and modestly. The unassuming but authoritative way in which he has controlled and directed the Appeal Committee has been a lesson to all those who have seen him in action. The result of his efforts has astonished those who felt that the College of Surgeons had little if any appeal to the benevolently minded. But you have succeeded, Sir, and we are deeply grateful to you. We would like you to join our ancient brotherhood.

" Mr. President, I present to you Hugh Kenyon Molesworth Kindersley, 2nd Baron Kindersley, to receive at your hands the Honorary Fellowship of the Royal College of Surgeons of England."

Lord Kindersley, who had signed the Roll of Honorary Fellows, was then presented with his diploma by the President, Sir James Paterson Ross, K.C.V.O.

The President hailed Lord Kindersley as one eminently suitable for the receipt of the College's highest honour, and acknowledged with the utmost gratitude the immense and effective work which he had carried out as Chairman of the Appeal Committee. He gave a very friendly welcome to Lord Kindersley and the members of his family on an occasion of great happiness to the College.

Lord Kindersley's very charming reply expressed his great gratitude for election to the Honorary Fellowship and his gratification at being able to add his signature to the many distinguished names he had seen on the Roll of Honorary Fellows. He spoke of the pleasure he had found in new friendships made in the College, his admiration for the College's work and his confidence that so worthy an appeal would achieve its merited success.

## PROCEEDINGS OF THE COUNCIL IN DECEMBER

AT A MEETING of the Council on 10th December 1959, with Professor Sir James Paterson Ross, President, in the Chair, Dr. Charles Huggins of Chicago was admitted to the Honorary Fellowship of the College.

Professor A. G. R. Lowdon was admitted to the Fellowship *ad eundem*.

Sir Russell Brock was appointed the Hunterian Orator for 1961, Sir Stanford Cade the Bradshaw Lecturer for 1960, and Mr. Terence Ward the Charles Tomes Lecturer for 1960.

The Blane Medal was presented to Surgeon Commander J. Glass, R.N., the Hallett Prize to Dr. Hameed Ud-Din Ahmed of the University of Gauhati, and the Begley Prize to Dr. Lydia M. Hayes of Kings College Hospital Medical School.

Diplomas of Fellowship were granted to 111 candidates, named in the list on page 66.

One diploma of Fellowship in the Faculty of Anaesthetists was granted and one diploma in Orthodontics.

The first Evelyn Sprawson Prizes were awarded to Mr. B. Dytham of University College Hospital Dental School and Mr. G. M. Edwards of Guy's Hospital Dental School.

The following hospitals were recognised under paragraph 23 of the Fellowship Regulations :

| HOSPITALS | POSTS RECOMMENDED | | |
|---|---|---|---|
| | General (6 months unless otherwise stated) | Casualty (all 6 months) | Unspecified (all 6 months) |
| NEWPORT — St. Woolo's Hospital (additional) | 2 H.S. | | S.H.O. (Thoracic) |
| KINGSTON — County Hospital (additional) | | | *Under para.* 23 (c) S.H.O. (E.N.T.) |
| BRISTOL — Frenchay Hospital (additional) | | | 2 Sen. H.Os. Plastic Surg. |
| AUSTRALIA—Footscray and District Hospital | Sen. Surg. Regr. H.S. | | |
| AUSTRALIA — Launceston General Hospital (additional) | Surg. Regr. | | |
| INDIA — Civil Hospital, Jullundur (new application) | Sen. H.S. | | |

## GRANT OF FELLOWSHIP DIPLOMAS

AT THE RECENT Final Examination for the Fellowship, five candidates out of twenty-one were successful in Ophthalmology, five candidates out of twenty-five in Otolaryngology, and 101 out of 386 in General Surgery.

At a meeting of the Council on 10th December 1959, Diplomas of Fellowship were granted to the following :

†SILBERMANN, Stanislas (*Sheffield*).
†HOLLIS, David George Hanbury (*King's College*).
JEFFS, John Victor (*Guy's*).
†RICHARDS, Stephen Higgs (*Guy's*).
WILLIAMS, David Knapman (*St. Bartholomew's*).
NEWTON, John Turner (*Manchester*).
FLETCHER, Alan (*University College*).
CARPENTER, Reginald Augustus (*The London*).
ERUCHALU, Raphael Chukudile Okoye (*University College, Ibadan*).
*MERRILL, Una Kathleen (*Sheffield*).
BHATTACHARYA, Samareswar (*Calcutta*).
*CLOVER, Peter Thomas (*King's College*).
AGGARWAL, Niranjan Das (*Punjab*).
CRAWFORD, Arthur Pinkerton (*Queensland*).
DE BEAUX, John Louis Marcus (*Madras*).
ROBERTS, William Michael (*Cape Town*).
SMITH, Thomas Bruce (*Sydney*).
*HILL, David William (*St. Bartholomew's*).
HUME, Arthur Christopher (*The London*).
*JONES, Mary Allan Craig (*Birmingham*).
ABERNETHY, Barclay Chivas (*Aberdeen*).
MUKHERJEE, Ajit Kumar (*Calcutta*).
YOGANATHAN, Balasubramaniam (*Ceylon*).
AMERASINGHE, Donovon Mark (*Ceylon*).
CHAMBERS, John Samuel William (*University College*).
FLOOD, Martin Joseph (*Sydney*).
STRUTHERS, Norman William (*Glasgow*).
WEBSTER, Charles Urquhart (*Aberdeen*).
ALLAN, Walter Ramsay (*Edinburgh*).
ANDERSON, Timothy Donald (*St. Thomas's*).
CHAMBLER, Kenneth (*Edinburgh*).
CRYMBLE, Bernard (*Durham*).
DATTA, Barindar Kumar (*Calcutta*).
DHANDA, Sath Paul (*Madras*).
DUNSTAN, Richard English (*Adelaide*).
FERNANDO, Wellege Hemachandra (*Ceylon*).
GARLICK, Frank Hender (*Queensland*).
KLING, Kenneth George (*Witwatersrand*).
McARTHUR, John Alastair (*Melbourne*).
McINTYRE, Donald (*Edinburgh*).
MANCHANDA, Hans Raj (*Bombay*).
MOHAN, Virendra (*Madras*).
VAN HEERDEN, Etienne Jon (*Cape Town*).
WIJESINGHE, Amarajeeva (*Ceylon*).
*ABRAMS, Joseph David (*Middlesex*).
ANCHEN, John Brian (*Melbourne*).
BUCKMASTER, Neil Stanley (*Melbourne*).
DAY, Brian Hanbury (*Royal Free*).
GIBSON, David Stuart (*Melbourne*).
GODBOLE, Chintaman Govind (*Nagpur*).
GUPTA, Brijlal-Chananram (*Bombay*).

INDAR, Rupert (*Dublin*).
JAGASIA, Kanaya Harchandrai (*Madras*).
MATHUR, Parshottam Sahai (*Agra*).
MEHTA, Vinodrai Ishwardas (*Bombay*).
MERTEN, Kenneth Kurt (*Sydney*).
PAUL, Asit Ranjan (*Calcutta*).
SANDOR, Francis Ferenc (*Budapest*).
SHAH, Hiralal Vadilal (*Bombay*).
SHAH, Shantilal Bhimshi (*Bombay*).
SINGH, Surendra Mohan (*Patna*).
THAKORE, Pradyot Ramniklal (*Gujarat*).
TRIVEDI, Surendra Ambalal (*Gujarat*).
WATSON-FARRAR, John (*The London*).
ABOU-ZEID, Mohamed Samir (*Cairo*).
CALVERT, James Murray (*Melbourne*).
COUTTS, John Piercy (*New Zealand*).
HARRIS, James Dunbar (*Adelaide*).
KUMBHANI, Sumant Jayachand (*Bombay*).
SHARAN, Umakant (*Patna*).
SINCLAIR, Morris Mowat (*Sydney*).
SMITH, John Graham (*Sydney*).
THAKKAR, Ashok Kumar Maganlal (*Bombay*).
UPJOHN, John William McKenzie (*Melbourne*).
VANNIASINGHAM, Peter Chitambaranathan (*Malaya*).
WEBB, Anthony John (*Bristol*).
COOK, William James (*Melbourne*).
DUNDEE, Douglas James (*Manitoba*).
FENWICK, John (*Sydney*).
FIELDING, George Durward (*Queensland*).
†HADLEY, Kenneth John (*Birmingham*).
KUSHLICK, Astor Rupert (*Witwatersrand*).
LUCK, Richard John (*St. Mary's*).
McLEISH, Graeme Roderick (*Melbourne*).
†MILLAR, Hugh Simpson (*Melbourne*).
NORCROSS, Keith (*Manchester*).
SARMA, Mutyam Venkateswara (*Madras*).
SCOTT, Peter Robert (*Melbourne*).
SHIRES, Peter Rodney (*St. Thomas's*).
THOMPSON, Robert Vance (*Melbourne*).
WILSON, Howie Keith Forbes (*New Zealand*).
BRARA, Birinder Singh (*Agra*).
BRESLIN, Francis Hugh Dominic (*Sydney*).
BROWSE, Norman Leslie (*St. Bartholomew's*).
BRUCE, Peter Thomas (*Melbourne*).
BUSBY, Eileen Rosemary (*Charing Cross*).
DHAWAN, Rajindar Parkash (*Punjab*).
ESPINER, Henry John (*New Zealand*).
HARVEY, Francis John (*Sydney*).
HUGHES, Leslie Ernest (*Sydney*).
JAJU, Jagdish Ramnath (*Baroda*).
JUDKOWSKI, Eliezer Leslie (*Cape Town*).
KUDELKA, Peter (*Melbourne*).
SHARMA, Ravindra Nath (*Punjab*).
SHRIVASTAVA, Rishi Kumar (*Nagpur*).
STALLABRASS, Peter (*St. Thomas's*).
THOMPSON, Albert Edward (*St. Mary's*).
WARMA, Sushil Kumar (*Calcutta*).
WICKHAM, John Ewart Alfred (*St. Bartholomew's*).
FREEMAN, Michael Alexander Reykers (*The London*).
ROBERTS, Lindsay Milton (*Sydney*).

*In Ophthalmology. †In Otolaryngology.

## A NEW CATALOGUE OF PORTRAITS

Readers are reminded that a new *Catalogue of Portraits and Paintings in the College* is now available. This new catalogue has been compiled by the Librarian of the College, Mr. W. R. LeFanu, M.A., and contains descriptions of all the portraits and paintings in the College with details of their history. There are four coloured plates and over 100 black-and-white illustrations.

The *Catalogue of Portraits* may be ordered from any bookseller or from the College, price 30s. a copy, postage 1s. 3d. The Publishers are Messrs. E. and S. Livingstone.

## DIARY FOR JANUARY

| | | | |
|---|---|---|---|
| Mon. | 18 | | Basic Sciences Lectures and Demonstrations begin. |
| Tues. | 19 | | Final F.F.A. Examination begins.<br>Voting Papers for election of Fellows to Board of Faculty of Anaesthetists issued. |
| Wed. | 27 | | Primary F.R.C.S. Examination begins. |
| | | 5.00 | Dr. D. H. Tompsett—Arnott Demonstration—Preservation and injection in anatomical material.* |
| Thur. | 28 | 5.00 | Lieut.-Col. J. C. Watts—Hunterian Lecture—Missile injuries in Cyprus.* |

## DIARY FOR FEBRUARY

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|---|---|---|---|
| Tues. | 2 | 5.00 | Prof. A. H. C. Ratliff—Hunterian Lecture—Fracture of the neck of the femur in children.* |
| Wed. | 3 | | Final L.D.S. Examination (Part I) and D.O. Examination begins. |
| Thurs. | 4 | 5.30 | Prof. T. Pomfret Kilner—Otolaryngology Lecture.* |
| Fri. | 5 | | Basic Sciences Lectures and Demonstrations for Dental Students end. |
| Mon. | 8 | | Course in Anaesthetics begins. |
| Wed. | 10 | | Final L.D.S. Examination (Part II) begins. |
| Thur. | 11 | | D. Phys. Med. Examination (Part I) begins. |
| | | 2.00 | Ordinary Council. |
| | | 5.00 | Dr. Bradley L. Coley—Moynihan Lecture—Tumours of cartilaginous origin.* |
| Mon. | 15 | | Course in Clinical Surgery begins. |
| Tues. | 16 | 5.00 | Prof. A. Sorsby—Ophthalmology Lecture.* |
| Wed. | 17 | | D.M.R.D. Examination (Part I) and D.M.R.T. Examination (Part I) begin. |
| Thur. | 18 | | D. Phys. Med. Examination (Part II) begins. |
| | | 5.00 | Dr. M. O. Skelton—Erasmus Wilson Demonstration.* |
| Fri. | 19 | | Course in Anaesthetics ends. |
| Wed. | 24 | | Primary F.D.S. Examination, D.M.R.D. Examination (Part II), and D.M.R.T. Examination begin. |

* Not part of courses.

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[1] "pHisoHex and Safer Surgery"—B.M.J., ii; 606. Oct. 3rd. 1959.

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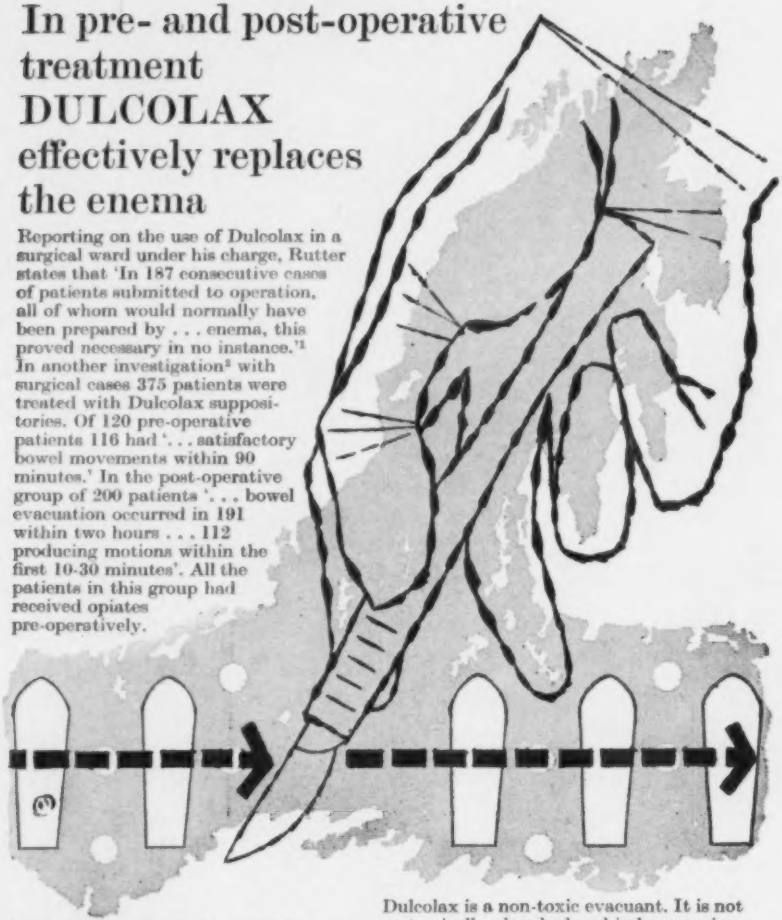
Reporting on the use of Dulcolax in a surgical ward under his charge, Rutter states that 'In 187 consecutive cases of patients submitted to operation, all of whom would normally have been prepared by . . . enema, this proved necessary in no instance.'[1] In another investigation[2] with surgical cases 375 patients were treated with Dulcolax suppositories. Of 120 pre-operative patients 116 had '. . . satisfactory bowel movements within 90 minutes.' In the post-operative group of 200 patients '. . . bowel evacuation occurred in 191 within two hours . . . 112 producing motions within the first 10-30 minutes'. All the patients in this group had received opiates pre-operatively.



The significant results shown in these and many other trials conducted in many parts of the world indicate that Dulcolax is capable of replacing the troublesome enema for any specific medical, surgical or X-ray diagnostic purpose.

[1]Rutter, A. G., *Lancet*, 1959, **i**, 1173.
[2]Ganz, P., and Zindler, N., *Medizinische*, 1955, **29-30**, 1042.

Dulcolax is a non-toxic evacuant. It is not systemically absorbed and induces peristalsis by surface-contact with the mucous lining of the colon. Mild and reliable in action, Dulcolax produces thorough and effortless evacuation without irritant effects or side-reactions. Dulcolax is available both in suppository and tablet form.
It is recommended for use whenever a bowel movement is considered necessary.

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